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CURIOUS CARS FOR FREIGHT-TRAFFIC.

BY F. B. BROCK.

[Written for the AMERICAN RAILROAD JOURNAL.]

IT is not the intention of the writer to indulge in a strain of invective against the patented appliances for freight-cars. Far from it. The freight-car in universal use upon our roads to-day is the subject of several patents, although the most important of them have long since expired and become public property. The entire equipment of railway engineering is a testimonial to the genius and perseverance of American inventors.

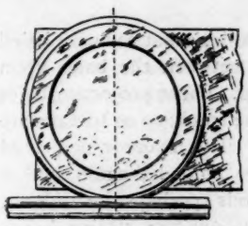

Fig. 1.

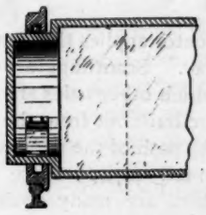

Fig. 2.

But among the hosts of patented freight-cars—some meritorious, and some of indifferent merit—there has appeared a fungus growth, for which the world has, as yet, found no commercial use, but which may find a place, for ought we know, in the progressive science of the future. Instances of these sporadic cases of inventive ingenuity are freight-cars, the excessive iron-work frames of which remind one of a section of the Coney Island pier, or one of Eads' structures spanning the Mississippi. Then, again, an inventor wants to overcome, to the utmost extent, "the great centrifugal force manifested in the turning of curves," and to "supersede the faulty and manifestly objectionable car mounted above a narrow pair of trucks, which are so readily overturned." The first object is worthy enough, but railway engineers seem to be unanimously of the opinion that a car mounted upon "a narrow pair of trucks" is good enough for them.

To remedy the "objections" indicated above, this particular inventor devised a freight-car, the points of excellence of which will be better gleaned by the reader from an illustration or two (Figs. 1 and 2, the former being a side elevation, the end of the car being broken away, and the latter a transverse section of the same).

This car is composed of a rectangular box, the center of gravity of which is low enough to satisfy any one. The car runs upon four annular or ring-shaped wheels. Overgrown journals or circular bosses project from the sides of the car. The interiors of these cylinders, on which the annular wheels bear, are recessed in order to enlarge the storage capacity of the car. The underside of the car is brought but a few inches above the rails. Anti-friction rolls are interposed between the journals and wheels. An interior circumferential groove is cut in the annular wheels, in which runs both the anti-friction bearing-roll and also a horizontal anti-friction wheel, arranged on top of the journal-bearing, for the purpose, it is said, of relieving the wheels from undue lateral strain. In short, the inventor wants "to do away with the ordinary car-trucks and wheel, and their attendant expense." Moreover, he wishes to bring the center of gravity down to the lowest extent; and he has done it, though, perhaps the reader may think, at the expense of some other valuable points.

Coal-cars also come in for their share of "improvement." They are made of various unnecessarily expensive shapes, and some are provided with elaborately designed "hatches"—to use a nautical term—for keeping out rain and snow in transit.

Grain-cars are not only made cylindrical, but with an interior double wall, both of iron, with wide air-spaces between for ventilation.

Various freight-cars have their frame-work made of tubular iron, while one in particular provides for a freight-car frame upon the telescopic principle. The main framing consists of large telescopic tube sections at top and bottom on both sides of the car. Springs of spiral form are interposed within the tubes to form a cushioned resistance in case of accident. Tubes also compose the truck-frames, which are connected to the wheels themselves in such a manner that the whole car will slide forward over its trucks for a given distance, upon the attempt, for instance, of another train to pass by on the same track.

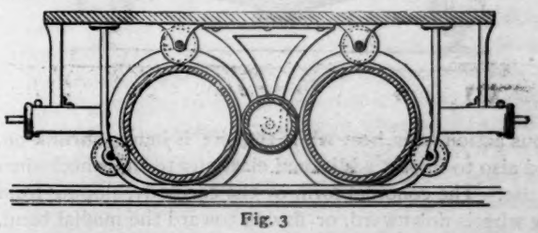

Fig. 3

The rolling-barrel idea seems to be a favorite one with the inventive aspirant. He has ever in mind economy of space and the lowering of the center of gravity. In Fig. 3 (a longitudinal sectional view) are shown two cylindrical barrels laid transversely upon the track, and provided with flanged tires corresponding to the gauge. These cylinders are kept apart with respect to each other by an encompassing cage, giving each barrel three rolling points of contact. This cage supports a platform and a coupling-head at each end. One of the rolling-bearings is common to both barrels, and is itself a carrier of merchandise. It is made hollow for that purpose. It is swung in position by brackets depending from the underside of the

platform. The immediate support of the latter is obtained by the upper rolling-bearings, and the endwise jars or strains are taken up by the central revolving carrier and the lower roller-bearings, which are swung below the axial lines of the main carrying-barrels. The carriers under way are constantly under a high degree of revolution. The inventor states that these bearings may be oiled equally well when the freight-car is in motion, but does not tell the quantity of oil necessary to keep them in proper condition, nor what means are provided to neutralize the law of centrifugal motion when oiling.

While we are on this branch of the subject let us look at one or two other types of revolving freight-cars, any one of which, if adopted, would certainly work a *revolution* in freight-traffic. A transverse elevation of a style of this car is shown in Fig. 4.

A peculiar construction is given to the wheels so as to give an elastic support, thereby, it is claimed, taking up the shock and reducing the wear and tear of the rolling-stock and track. For this purpose the wheels are made with a cast-iron central portion and a wrought-iron rim or tire. The periphery of the cast-iron portion is enlarged laterally, and formed with a lateral groove having recesses at intervals for the reception of bearing-springs of steel or rubber. Surrounding the springs are felloes of wood, held in place by a circular metal-band. The wrought-iron tire is applied while heated and cooled by minute jets of water, so as to be shrunk on uniformly. The wooden felloes serve, it is said, to protect the springs against injurious action from heat while the tire is being shrunk on, and also to impart additional elasticity to the wheel when in use. The conoidal form of the car-body, sloping from the wheels downward, or flaring toward the medial band, facilitates the discharge of such freight as grain through the central peripheral openings.

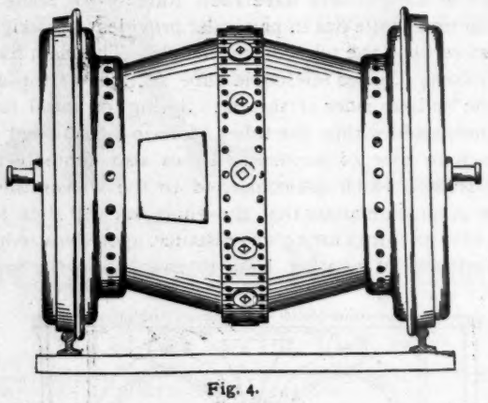

Fig. 4.

The inventor is silent as to the frictional generation of heat from the agitation of grain in such conveyances. While the car might escape without a hot-box, how about hot grain?

Another instance of this genius of invention comprises two rolling flanged barrels arranged within a truck-frame of skeleton form, with a central longitudinal board, elevated upon a converging frame-work, for the passage of the train-hands along the length of the train. The cylinders have perforated ventilating pipes passing endwise through them, and also perforated partition-plates therein to prevent the load from shifting.

In Fig. 5, we have a unique style of freight-car, which is adapted, the inventor says, "more especially to cars adapted for use on triple-rail tracks." It requires no exhaustive treatment of the advantages of this system to be here set forth. What merits it has may be evolved from a glance at the illustration. "Triple-rail tracks!" Methinks the phrase has a pleasant sound.

There are many other curious freight-cars which have been patented, but I will not take up the JOURNAL'S space beyond the illustrations given. There is just one other device, however, of which I would like to speak—a patented process for loading flat freight-cars. The inventor applies this process in loading a flat car with baled hay. Scantlings are stuck in between the bales upon which other bales are to be hung. These projecting bales are built out from the side of the truck, so as to take up the path of the adjacent trucks. The inventor neglected to tell us how these bales were unloaded again, but as there are many obvious methods perhaps he did not think it necessary. For instance, any way-station house would scrape off the projecting bales, and probably most of the others with them. Or they could be unloaded at very short notice by meeting a train on the adjacent track, or by passing empty cars on any of the side-tracks along the route.

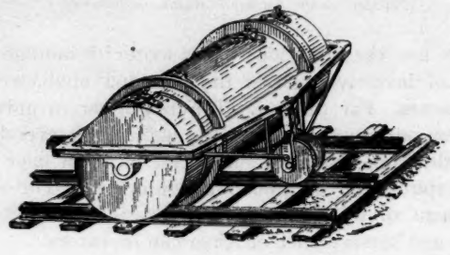

Fig. 5.

ACCIDENTS AT OVERHEAD BRIDGES, HIGHWAY-CROSSINGS AND PERMANENT WAY.

BY WM. S. HUNTINGTON.

[Written for the AMERICAN RAILROAD JOURNAL.]

IN treating of railway accidents in a general way, it is hardly worth while to indulge largely in any unprofitable speculations, or devote time and space to that class of accidents which may be called non-preventable, or charged to "dispensation of Providence." Accidents of some kinds will happen in spite of all precautions taken to prevent them; but killing people at overhead bridges is not one of this class. A writer on railway construction says, in a recent article, that accidents of the kind under consideration are more frequent than formerly and gives directions for their precaution. "Freight-cars," he says, "are built higher than formerly, some of them being 14 feet from the top of the rail to the top of the car, and overhead bridges should have a clear space of 20 feet from the rail." Now there are hundreds of trainmen and others who ride on the top of freight-trains that are just tall enough to be scalped by a 20-foot bridge while standing on a 14-foot car, so that, as a measure of safety, officials must either employ shorter trainmen, or build higher bridges, or

lower cars. A bridge 20 feet high might ordinarily be considered safe, as it is only occasionally that a 14-foot car is in a train, and common prudence or foresight would suggest that the "deck-passenger" would find a place on the lower cars especially when passing under bridges. But there are divers reasons why some one might be on the high car just at the time of reaching the bridge, and that particular person is very liable to be a little over six feet in stature. Or perhaps the bridge was built 20 feet above the rail, but track repairs frequently necessitate a raise of several inches, and the bridge not being correspondingly raised soon finds a victim. Several devices are in use to give warning at such bridges but they frequently fail, and the only real safety lies in *being sure that the structures are high enough*. In some localities it is a matter of more or less expense and inconvenience to get a safe height, but a failure to do this is frequently expensive and otherwise unpleasant, and when a height of 20 feet may be regarded as *pretty near safe*, it would not be very expensive or troublesome to make it 21 feet. The last foot would save life to trainmen and ready cash to the companies. "Through bridges," or what are known as covered bridges are often found too low, the roof being too near the rail to allow of even a man of low stature to stand erect and go through with safety. It is a matter of economy to cover wooden bridges to prevent decay. The sides are tightly boarded and painted, and in some parts of the country the roofs are shingled, but the most common covering is slate. Many beams and other timbers are unnecessarily low, and of no earthly use but to kill people and stand as specimens of engineering stupidity.

It is not accurately known how many have been killed in the United States by these bridges, but the list is a long one. In Massachusetts, in the year ending September 30th, 1883, 14 accidents are reported. In hilly and thickly populated sections there are more of these structures than in level districts where crossings are mostly at grade. Probably New England and the middle states have more of those structures than any other parts, and it is not easy to base an estimate of the whole on a New England report. But this is a kind of accident for which there is no excuse, save the exercise of too much of the same kind of economy that destroys life through many other preventable causes; and if there is an overhead or through bridge on this continent, or anywhere else, that is not known to be absolutely safe it should receive attention at once. There is a plenty of room above and below for safety, and no extra taxes for using it.

Another class of accidents which cause much trouble and brings many to grief or the grave is the deadly road-crossing. There is scarcely anything more dreadful in the line of railway disasters than the frequent collisions of trains with carriages at grade-crossings. The causes of such accidents are various and somewhat peculiar in their nature, and although many of them may be removed, it can hardly be said that all the causes can be annihilated and crossing a railway at grade rendered absolutely safe. The causes, either remote or direct, that lead to these accidents are not always under the control of either the railway operatives or the highway travelers, and to assert that there is no excuse for grade collisions would be out of reason. It has formerly been the custom of the press to characterize these mishaps as "the latest railway murder," and charge the officials with criminal neglect and assert that they alone should bear the blame. In many instances of serious disasters of this kind there are evidences of a lack of thorough management, but it is true that the general management has made strong efforts to reduce the frequency of this class of accidents. Flagmen are kept constantly at dangerous points, gates are provided, automatic-signals to give warning by day or night, the bells and whistles of locomotives and the best power-brakes are employed to prevent these mishaps—and yet they are frequent. Certainly the railways have done nobly in this matter and it remains for the trespassers, who are the victims, to stand the blame in most cases of injury. People are careless, and pay no attention to the warnings and suffer death for their foolishness, and their friends collect damages in large sums. People argue that it is not they who must look to their own personal safety, but the railways—having many or all the favors they ask of the public, and waxing rich by serving the public—must, perforce, guarantee the safety of all who may trespass on the right-of-way at all times and places, and under all circumstances, whether necessary or otherwise; and whether deaf, dumb, blind, sound or cripple, on foot or in a carriage, or *à la cheval*, drunk or sober, day or night; on board a train, or trespassing by walking or driving on the permament way, or in a waiting-room; whether riding on a pass or paying fare—in fact in every case, the railways are considered by a very large share of the unreasonable public to be responsible for any injury persons may receive, no matter how much or how far the unfortunate may be out of his or her proper place. They reason after the manner of the Hibernian, who was on shipboard in a gale. When some expressed fears that they would all go to the bottom he said, "Be gad! I paid the captain to take me across and I'll make him stick to the bargain." If they lose a limb or their lives through their own stupidity the company must pay for it.

But seriously, the railways have done their duty, as a rule, in the matter of safety at grade-crossings, and if the public will do as well and exercise a reasonable amount of caution, and act on the principle that "self-preservation is the first law of nature," there will be less slaughter at these crossings. The only means of absolute safety lie in making *all highway or street-crossings either above or below grade*. Although this is not an impossibility it is impracticable, which leaves the matter in a shape for legislation. The railways need a little of it to make them more particular in the enforcement of orders. Aside from the safety appliances that have been supplied to keep people off the track in times of danger, the bell and whisle are ordered to be sounded. Enginemen frequently neglect this, and as no notice is taken of it by their superiors the habit becomes chronic and causes much trouble. Nearly all roads are strict enough in their orders to ensure safety, but are not rigid enough in their enforcement of these orders. For this there is a remedy. Then let the public understand that they must observe certain rules which shall be prescribed, and crossings can be made comparatively safe.

As an instance of the difficulties experienced by railway men in enforcing trespassers to observe the rules for safety, another quotation from the Massachusetts commissioners' report is offered. For the same year above quoted, 93 trespassers were killed and 54 injured; 112 were

on the track, and 33 in the cars *unlawfully*. Killed at highway crossings, 15; injured, 29; whole number, 44. Killed or injured at crossings guarded with gates or flagmen, 18; not so guarded, 21. This shows that some people are fond of getting into danger, and perhaps the best measures of safety that can be recommended for these very unfortunate people would be to discharge the flagmen and remove the gates. When people have learned to appreciate the efforts of officials in their behalf there will be less cause for styling railway men wilful murderers, and less grief in the land.

RAILWAY MEDICAL SERVICE.

BY S. S. HERRICK, M. D.,
SECRETARY STATE BOARD OF HEALTH OF LOUISIANA.

[Written for the AMERICAN RAILROAD JOURNAL.]

SECOND SERIES.—THE UNITED STATES.

II. THE NORTHERN PACIFIC AND THE ATLANTIC AND PACIFIC RAILWAYS.

ON the Northern Pacific Railway the medical service is organized as a mutual benefit association. All officers and employés of the company are required to be contributing members, except those whose monthly pay is less than $25. The board of managers consists of three representatives from each of the operating divisions, one elected by employés of the transportation department, one by those of the road department, and one by those of the machinery department. To these are added a number, equal to thirty per cent. of the whole, chosen by the general manager, who also serves *ex-officio*. The members and officers of the board of managers serve without pay, except the secretary, who is the executive officer.

The medical staff consists of one chief surgeon, hospital surgeons, division and local surgeons. The chief and the hospital surgeons receive salaries from the association fund. The others are paid according to a settled fee-bill, or by passes over the road.

Members whose monthly pay is $25 or over and less than $100 contribute fifty cents per month to the fund; those receiving $100 or over and less than $200 contribute one dollar per month; those receiving $200 and over contribute two dollars per month. These dues are deducted from their monthly pay,

The benefits of the association are as follows: In case of sickness or injury the member is entitled to attendance by the medical staff, to medicines, and to maintenance in hospital provided the case disables him for work. He is also entitled to an allowance of fifty cents for every working-day so lost, counting after the sixth day of disability. Should the disability last more than six months, the allowance is reduced one-half. When the injury or sickness arises from other cause than accident in discharge of duty, this money allowance shall continue not more than one year. Attendance and medicines are also supplied at the houses of members, who reside within a convenient distance of a surgeon employed by the association. In case of complete disability, medical attendance and medicines may be supplied to families of members.

In the event of death of a contributor from the result of accident while in discharge of duty, either at the time or within six months thereafter, his heirs or representatives are entitled to receive $150 from the funds of the association. In the event of death from ordinary disease, an allowance is made of $50. These payments are conditioned upon a release of the company from all liability for damages growing out of injury or sickness. The liability of the association does not extend beyond the fund contributed by members, nor does the period of treatment and payment of daily allowances exceed the time the beneficiary has been a contributor to the fund.

At the time this association organized (October, 1882), employés up to fifty years of age were admitted, but of those subsequently employed none have been admitted over forty-five years old, nor any found in unsound health by the examining surgeon.

Any employé requiring medical or surgical relief must present a surgeon's order signed by a railway official, except in case of accident or emergency, when the order will be furnished as soon as convenient. Discharge certificates are given to patients on completion of illness or disability. The above benefits are not granted to those suffering from the results of intemperance, disorderly conduct, venereal infection, or any chronic disease contracted prior to entering the service of the company, nor to those who have paid no assessments.

The company has erected hospitals at Brainerd, Minn., and at Missoula, Montana Territory, for the benefit of contributing members, the former having accommodations for 90 patients and the latter for 70. No other hospitals are available for use in the sparsely settled region traversed by its lines. There is no examination of any class of employés with reference to integrity of sight and hearing, or soundness of general health. When doubt relative to the general health of an individual exists, he is subjected to a medical examination. It is evident that the object is rather to protect the funds of the association than to guard against accidents liable to grow out of defective sight or hearing of trainmen, or sudden failure of their vital organs.

The sanitation of railway-carriages, of buildings, grounds, etc., is attended to "in a general way." Strict regulations are enforced relative to transportation of live-stock, to prevent over-crowding, deprivation of food and water, too long confinement, or admission of diseased animals to cars.

It was announced in 1883: "Vice-President Oakes of the Northern Pacific Railroad Company, has authorized the general manager to guarantee all benefits payable by the association to its members to the extent of $6,000 per annum. This is practically a contribution to the funds by the Northern Pacific Company of $100,000, if interest be considered at 6 per cent.; but at the rates of government bonds it would be equivalent to not less than $150,000 invested in such securities for the benefit of the association.

"The company also agrees to put in complete order and turn over to the association, free of charge, the large building now used as a hospital at Brainerd.

"Also to erect such additional buildings as may be required from time to time without cost to the association.

"The local treasurer of the Northern Pacific Railroad

company is authorized to act as custodian of the funds without charge.

"The Northern Pacific Railroad Company also agrees to furnish all blanks, forms and stationery which will be no small item.

"A part of the consideration to be paid to local physicians will consist of free transportation over the railroad, and this also will be furnished by the company, and relieves the association of expenses to that extent.

"With these liberal concessions on the part of the company, it is reasonable to infer that the amount of benefits to be paid to members in case of sickness or accident, in proportion to their contributions to the funds, will be largely in excess of the benefits payable in voluntary unions or associations, where on guarantees are given, and where, if the funds become exhausted, there can be no further payments without additional assessments upon members."

The following features are also indicated in the regulations, but I conclude have not yet gone into operation:

"Provision may also be made for annuities, after a given number of years of service, proportioned to the amount of dues paid in.

"A life insurance department may be included, if the board of managers at any time should deem such action expedient. The premiums for life insurance would be in addition to the ordinary dues and would be optional."

For information on the medical service of the Northern Pacific Railway, I am indebted to Mr. H. W. Knauff, the secretary, who has courteously answered the list of inquiries and furnished printed documents. He adds that "Our organization is working smoothly and satisfactorily, and has the sympathy and approval of the employés." There can be no question that the medical department of this company is now regarded as indispensable by both management and employés.

I am informed by Dr. W. A. Drake, chief-surgeon and hospital superintendent, that the Atlantic and Pacific Railway owns a building used as a hospital at Albuquerque, N. M., which is in charge of a resident physician, steward and nurse, paid by a fund that is made up of half-dollar deductions from monthly pay of all employés. Expenses of hospital, medicines, etc., are paid from the same fund. Physicians at points on the line of road are paid fees for attention to employés who find it impracticable to go to the hospital. The general management is by officers of the railway company without compensation. These benefits are enjoyed in ordinary sickness as well as injury from accidents, but do not extend to the families of employés. Exception is made to venereal affections and others growing out of misconduct.

No physical examination of men is made previous to their engagement by the company. No provision is made for relief of the families of employés sick, injured, or deceased in service, either by the company or by any independent organization among the men. Buildings and grounds receive some sanitary supervision, but there are no regulations relative to the transportation of live-stock.

The medical service of this company went into operation in 1882. It is evident that there is time and room for growth of the medical department of both of these companies.

THE CRACKING OF PAINT AND VARNISH ON CARS.

BY A. P. SWEET.

[A Paper read before the recent Convention of the Master Car-Painters' Association.]

THE subject, as I understand it, relates to the trouble of cracking, etc., as experienced in connection with passenger-car work, and as such I introduce it for discussion before this association.

There are many theories as to the cause of the cracking of paints and varnishes. Some are well defined. Others are not satisfactorily explained. I do not anticipate being able to add much to what is already known, but will advance a few thoughts which may call forth the views of others on the subject.

The old adage, "it takes two to make a quarrel," is as true when applied to paint and varnishes as it is to individuals. A single coat of either seldom, if ever, produces cracks. These make their appearance only after two or more coats have been applied; consequently it is necessary to have a body of color or varnish, consisting of two or more coats, before any trouble of this sort makes itself manifest. This being the case, it follows that the cause of the difficulty must be sought for in the coatings themselves, either in the quality of the material employed or in the mode of applying them. Poor and cheap oils and japans, especially the latter, are a fruitful source of cracking in paint, but by far the most prolific one, in my opinion, is the hurried application of succeeding coats before the preceding ones are dry enough to receive them.

If sufficient time is not given, cracks will inevitably follow such a mode of procedure. I am of the opinion, also, that very little blame can be attached to the wood used in the construction of the car, as the most of it is comparatively well seasoned, and its expansive and contractive force is not sufficient to cause serious trouble. If green wood were used there might be room for this excuse, especially where the cracks run in the direction of the grain, and are large and deep.

Before pursuing this subject further it may be well to examine a little into this theory of the drying of paint. It is purely a chemical process, not a mechanical one as as some suppose. Paint dries by the evaporation of its volatile parts and its absorption of oxygen, and it is heavier when dried than when in the liquid form; having attached to itself a sufficient amount of oxygen to increase very perceptibly its weight some six per cent.

The best grades of linseed oil are said to contain from 70 to 80 per cent. of substance called linaleine, a resinous and slow-drying oil acid, which imparts to the oil its elasticity.

In the process of drying contraction occurs; the various atoms of which the coatings are composed move closer and closer together, and as this contracting force is easier with than across the grain, cracks at right angles to it are formed. This fact suggests the necessity of so adjusting the elasticity of the various coats, that the force exerted in drying may be as nearly equalized as possible, as this contracting force is continued until all elasticity has left the paint, oxygen ceases to be absorbed, all the oil acid has disappeared and nothing but a hard, brittle surface remains.

Under the microscope, in the first stage of cracking, the surface presents nothing unusual except that the cracks appear clean-cut and sharp on the edges. As months pass by and the surface is exposed to the atmosphere, changes of heat and cold, wet and dry, the cracks become more numerous; and in the last stage, when the oil is entirely destroyed, the surface assumes the appearance of innumerable rectangular masses, higher in the center than at the edges, like small mounds raised by the power of contraction and adhesion.

Cracking in color coats may by careful attention to preliminaries be reduced to a minimum, provided good, first-class materials are used and sufficient time given each color to dry.

Where varnish is to be applied as a finish, all coatings should have oil in their composition, and yet be mixed to dry flat. They should be applied very evenly and thinly, even if it necessitates an extra coat to cover and make a solid job.

Striping and ornamenting should be done on flat color, which gives time for hardening and fits it for the varnish coats to follow. If work is done in this way, I think very little fear of premature cracking need be entertained; at least not until time and weather have sufficient opportunity to play havoc with its beauty, and the natural decay of the materials themselves necessitates a thorough overhauling and repair. Rubbing varnishes are another source of trouble, causing the succeeding coats of finishing varnish to show signs of cracking long before they otherwise would, as it does not agree with the slower-drying varnishes usually applied above it, being of a harder and more brittle character; serving the purpose of producing a fine smooth surface, but sacrificing the durability of the job.

Concerning the cracking of varnish I have not much to say. It seems to me that many of the reasons given above will apply to it as well as the paint. Poor material in the shape of varnish is poor indeed. A first-class article only will give first-class results. It must be elastic, or it will crack early and badly, no matter how good the under coats of paint may be. Good varnish on good color coats will not give any signs of cracking until by repeated varnishing it has accumulated a thick coating of brittle, inelastic gum. No painter can say truthfully that his cars never crack, as it is a natural consequence of decay and will come sooner or later to the best of material. That varnish cracks to a great extent at right angles to the grain of the wood, I think, is due in some degree to the same reasons as given above for the cracking of paint; and after its elasticity is destroyed by age, vibration has a great effect upon the hard and brittle coating of gum that remains, coupled with expansion and contraction caused by variation of temperature and the disintegrating influence of the weather.

THE RAILWAYS OF JAPAN.

THE British Legation at Tokio, through its Secretary, the Hon. P. Le Poer Trench, under date of April 31st, has promulgated some valuable railway statistics on Japanese railways. He says the Mikado's government is much occupied in construction, which in 1868-69 assumed a definite purpose. They met, however, with such strenuous opposition from the large party which always endeavored to impede any progress towards western civilization, as well as with other difficulties analagous to those which retarded the introduction of railways into England, that it was only in the year 1870 that this great step towards the opening up and development of the country was eventually determined upon. It was proposed to construct a railway connecting Yeddo and Kioto, the new and old capitals of the empire, together with a branch line from Yedo to Yokohama, and another from Kioto to Tsuruga, along Lake Biwa, which is the center of a great traffic, and which branch line would connect the west coast with the two capitals. By means of this latter line the rich crops of the great rice-producing districts were to be placed within easy reach of the metropolitan population, and the Provinces of Yechizen, Wakasa, and Omi were to be brought into close contact with Kioto and Osaka. Theoretically, the scheme was a grand one, but a great obstacle presented itself against putting it into practice, and that was the difficulty of obtaining the necessary capital for carrying it out. It was clear that the construction of so many railways could not be undertaken by the government without external assistance. It was therefore decided to make an attempt to get the funds abroad, and Mr. H. N. Lay, as commissioner for the government, was sent to London to endeavor to obtain a loan of £1,000,000. That gentleman succeeded in placing the loan on the London market at 98, bearing interest at 9 per cent. The scheme for making a railway through the center of Japan had, however to be abandoned, or, at any rate, postponed, and it was decided only to construct a line between Tokio and Yokohama. The Tokio and Yokohama section of of the Imperial Railways of Japan was the first railway constructed in Japan, and connects Tokio with Yokohama. It was commenced in 1870, under the supervision of Mr. Morrell, who died in 1872 and was succeeded by Mr. R. Vicars Boyle. The railway is eighteen miles long, and as a single road was opened for traffic on June 12th, 1872 (the state opening taking place at Tokio on October 12th of the same year), and was completed as a double line throughout on May 8th, 1880. The gauge is 3 ft. 6 in., the same as all the other railways in Japan. There are six stations—viz., Yokohama (terminus), Kanagawa, Tsurumi, Kawasaki, Omori, Shinagawa, and Shinbashi (Tokio terminus). From Yokohama the line passes for one and one-half miles along an embankment constructed across Kanagawa Bay, thence to Shinaga, mostly through wet rice-fields, then by an embankment of two miles over the mud flats of Shinagawa, and the last one and one-quarter miles through a portion of Tokio to Shinbashi Station, the terminus. The engineering difficulties were few, the country passed through being very flat, and the heaviest gradient being only one in a hundred for one mile. The largest bridge, over the Rokugo River, near Kawasaki, is constructed of iron, and has six spans of a hundred feet each, and twenty-four spans of forty-four feet for flood openings. The total cost of the line is said to have been £616,734, or about £34,263 per mile. Considering that the engineering difficulties were few, and the country traversed flat, the amount expended on the construction of this railway appears to have been needlessly large, especially when compared to the cost of the Kobe, Osaka, Kioto, and Otsu lines; but it must be borne in mind that it was the first railway constructed in Japan, and that consequently in the matter of ruinous contracts the government had to pay dearly for its experience.

In 1873, the number of passengers carried on this line was 1,223,071, while in 1884 the figures had increased to 2,172,105, while the coaching receipts, which in 1873 were 395,988 yen (5 yen to the pound), had increased in 1884 to 491,383 yen.

The goods carried and the receipts therefrom rose from 9,121,431 kin (8 kin = 1 cwt.) and 24,590 yen in 1874, to 56,912,207 kin and 42,253 yen in 1884, respectively. The line in 1881, the last year for which the expenses are given, was worked at about 50 per cent. of the revenue. Mr. Trench states that railway traveling is as popular with the lower classes in this country as it is with the native population in India. The goods-traffic, however, has never been properly developed, but it will doubtless greatly improve now that the branch line from Shinagawa to Kawaguchi has been completed. Another and a still greater impetus would be given to the goods-traffic if the government were to carry out the project of constructing a pier at Yokohama (connected with the railway by a goods line), where merchant vessels could load and discharge their cargo. When the line was first opened, all the rolling-stock was got from England, but after a time workshops were established at Shinbashi, where now all the carriages, wagons, etc., are made, but the wheels, axles, and buffers are still imported, and all the engines come from England. The line is very well managed, and should bring in a handsome revenue to the government, but to ascertain the exact amount is impossible; it is only known to the Japanese officials. The fares are moderate, but more liberality might be shown in the issuing of return tickets, and season tickets would also be a great boon to the large number of people who make constant use of the line. This is the only double line of railway in Japan. The second railway built in Japan was the Kobe and Osaka section of the Imperial Government lines. It was opened in 1874 for its full distance of twenty-two miles, the cost of construction being £747,371, or about £33,970 per mile. From Osaka to Kioto, a distance of twenty-seven miles, an extension was opened in 1876, at a total cost of £563,589, or about £20,875 per mile, and the further extension from Kioto to Otsu, 11¼ miles, at a cost of £157,227. The Tsuruga and Ogaki Railway (49 miles), which connects the northern end of Lake Biwa with the Japan Sea, was commenced on April 6th, 1880. Cost of construction, 2,895,462 yen, or about £550,000, which is 522,669 yen less than the original estimate. The first section was opened in 1882, and the last in 1884. The Temlya-Sapporo and Poronal Railway, which is under the control of the Department of Agriculture and Commerce, is 56½ miles in length, was opened for passenger and goods-traffic in November, 1880, as far as Sapporo, in June, 1882, to Yebetsn, and the whole line was completed in May, 1883. Cost of construction, 1,228,452 yen, or about £204,742. This railway is the only one in the Island of Yezo.

The Japan Railway Company has an authorized capital of 20,000,000 yen, divided into 400,000 shares of 50 yen each. The amount of shares issued on the formation of the company was 119,314, and at a general meeting of the shareholders, held on January 29th last, it was determined to make a further issue of 119,314 shares, so as to increase the paid-up capital to 11,931,400 yen, and thus enable the company to proceed with the construction of the several lines they have in contemplation. The Uyeno (Tokio), Takasaki, and Mayebashi section of the Japan Railway Company's line (68¼ miles), was commenced in 1882, and was opened on October 21st, 1883, as far as Honjo (51¼ miles from Tokio), to Shinmachi on the 27th, of that year, to Takasaki on May 1st, 1884, and to Mayebashi on August 20th last. The formal opening of the line to Takasaki by His Majesty the Emperor took place on June 25th of last year. Cost of construction about £300,000, but besides this sum a considerable outlay is still necessary for the construction of permanent bridges of iron, with brick and stone foundation, over several rivers of considerable width, hitherto crossed by mere temporary structures of timber.

Ordinary accidents and casualties occur from time to time, as on all lines of railway, but, with the exception of the one in October, 1877, there have been none of a very serious nature, and willful damage to railway property is happily almost unknown in the country. The average rate of speed, including frequent stoppages, is 18 miles per hour, but in hilly districts, where the gradients are heavy, it is a good deal less. There are several new lines in the course of construction.

CAN RAILWAY COMPANIES AFFORD TO BUILD THEIR LOCOMOTIVES?

We have already given some very excellent and well-supported arguments by several manufacturers in support of the proposition that it is cheaper for railway companies to purchase their equipment by special contract than to manufacture it in their own shops. A well-known locomotive builder, in an interesting letter in our issue of October 8th, went over the general ground and dwelt somewhat on the proposition that if railway companies kept up their equipment to a standard and did not wait until they were obliged to make large orders they would not be in danger of having to pay excessive prices on account of sudden demand. We will now recapitulate some of the arguments in favor of buying locomotives by contract which have been brought out or suggested by the discussion thus far.

Railway master mechanics of course are disposed to think that they can build as cheaply as they can buy, if not more cheaply. How do they know? Assertions are easily made, but can they be supported by the detailed figures?

It is not an easy matter for a railway company to take account of all the elements of cost which are concerned in the construction of locomotives in its own shops. The cost of materials actually purchased for the purpose and the amount of wages actually paid to the men working on such locomotives may be readily ascertained; but there are various other items of cost which it is difficult if not impossible for the company to know. Among these we may mention the following:

1. Interest on capital.—If a locomotive is to be built, the material for it must be purchased several months before its completion. Wages must be paid also for several months. Interest should be calculated on the amount of capital necessary to do this. A railway company, equally with a private manufacturer, must pay something for the money employed. If the company does not pay for the money so employed, it means that the stockholders lose that much return on their capital invested. The capital invested in tools, buildings, etc., is also to be considered.

2. It is common to charge to the construction of a locomotive the materials *at the actual cost*. This cannot be correct; because the handling and storage of materials usually costs something, and there is a certainty of unsuitable materials accumulating, which eventually have to be thrown away, or sold as scrap. These considerations, confirmed by the experience of every manufacturer, indicate that it is impossible to buy materials and charge them out at the cost price without making a loss.

3. Freight on materials.—The cost of hauling materials from the points on the company's line where purchases are made to the shop where the locomotives are built is usually overlooked. In some cases in our knowledge the entire amount of coal hauled over the company's line to keep the shop running had no freight charged to it.

4. Spoiled work, defective material, etc.—In the practice of every shop it will be found that after considerable work has been done on some parts of a locomotive, defects may be developed which will necessitate throwing such parts in the scrap pile and making them over. Mistakes also occur; parts are incorrectly fitted up. These elements of expense should be borne by the locomotive under construction. It is frequently the case, we think, that they are entirely ignored, and that the locomotive is only charged with the cost of the finished and perfect parts which finally compose it.

5. General expense.—The most important point is the inadequate allowance for general expenses. If the wages of the machinists, blacksmiths, iron-founders, and other mechanics employed in the construction of a locomotive, amount to say $4,000, the amount of incidental expenses for superintending, foremen, draughtsmen, clerks, purchasing agency, shop clerks, janitors, carters, helpers, etc., is a very high percentage of the wages paid to the mechanics. This percentage is very much larger than is commonly supposed. It may be stated approximately, including repairs of buildings, maintenance of tools, taxes, insurance, etc., at from 60 to 100 per cent. of the amount paid for direct labor; in other words, if $4,000 is paid to the mechanics who work directly on the locomotive, from $2,400 to $4,000 additional would be absorbed by all the incidental labor and expenses involved. The accounts of any manufacturing establishment will indicate this.

Now, the great locomotive-building establishments *know* exactly how much every engine which they build costs them. There is no guess-work about it; no convenient ignoring of many elements of cost which railway officers and employés often think it is not worth while or not expedient to charge up. We have printed the items contained in a form used by a leading firm of locomotive builders, showing in exact detail the number, description, weight (if material), rate and amount of every article and element going to make up the cost of each individual locomotive built. The list comprises 429 different elements of cost, under 16 subdivisions. The use of this form will effectually test the accuracy of railway shop accounts. If the railway master mechanic will fill up the form fully and accurately it is probable that in most cases it will indicate that many items are ordinarily overlooked, and that the actual cost of a locomotive is generally a good deal more than the apparent cost as reported to the company.

Can railway master mechanics gainsay the arguments and assertions which have thus far been produced on the side of the contract shops? If so, let us hear from some of them. The question involved is of very great importance to railway companies, and we desire the fullest light upon it from both sides. Much more might be said in regard to locomotives, and the car-builders have not yet been heard from specifically.—*Railway Age.*

Car-Seats.

THAT an entirely new departure in car-seat construction is needed is apparent to any one who has studied the American car, says the *Scientific American.* One difficulty to be met and overcome is the insufficient width of the American car-body. Bodies from 12 to 18 inches wider than those now in use may safely be carried on trucks of the standard-gauge, even at high rates of speed. This has been done for years on the Erie road, without accident. A wider car would, however, call for radical alterations in stations, platforms, bridges, tunnels, signal-towers, and even in the tracks of some roads.

Such alterations and improvements cannot be looked for at present. More room in the seats can be obtained by sacrificing one seat in the width of the car; the space thus gained being given to the aisle and the three remaining seats. Many faults of car-seats may be corrected without structural changes in the cars themselves. One glaring fault is the insufficient width of the seat, from front to back, which does not properly support a full-grown person. The cushion is of improper shape, being highest in the middle; a form made necessary by the reversible back, although its convex form is much better than those in which an attempt has been made to fit the person. The back is too low to support the head and shoulders comfortably, yet it projects from seven to eight inches below the level of the seat, and is so much too wide. This wastes a large quantity of expensive covering material. Most backs do not give support at the proper place, and are convex on the corners, where concavity is needed. They should be convex both horizontally and vertically. The seat, from 17 to 18 inches high at the front edge, is about right for a six-foot man, yet the foot-rest is too far away to be of use even to a tall person, and is beyond the reach of others. With a practicable rest the present height would be proper. The seat-frame, while bulky and heavy, is not strong, and is placed so low that there is no room beneath the seat. By simple modifications of the frame, this space could be utilized and available for satchels, etc.

Another evil belonging to the reversible back is the necessity for making the seat parallel with the floor. A tilting seat, which tips the frame one-half or three-quarters of an inch, has in a few cases been adopted, It costs much and the advantage is not appreciable. The inner end of the seat is well covered with catches, mouldings and bars which search out tender portions of the anatomy. The sharp moulding is architecturally correct on the window rail, because as a cornice it crowns a wall. This may satisfy the architects, but common passengers would rather violate architectural proprieties and have round corners well cushioned.

Alterations are needed in the aisle end of the seats. The fashionable wood end is less comfortable than the old style of iron, and is inconvenient because it is open. The arm rests are hard, and the "nickel-plated horse-

rasps" of some roads are a public nuisance. A plush surface is by far the most satisfactory.

The following average dimensions of passenger-cars and seats will give the inventor some idea of the problem before him: The inside width varies from 9 feet 2 inches to 8 feet 5 inches above the truss-plank; below or within 11 or 12 inches of the floor the car is usually from 2½ to 4 inches narrower. Seats are spaced from 26 to 36 inches between centers, and have from 11 to 18 inches in the clear at the level of the seat. The latter is a liberal figure. The back is from 26 to 37 inches long, which leaves an aisle of about 24 inches, according to the width of the body of the car. The seat-cushion is longer than the back to the extent of an inch or two. The cushion is from 17 to 20 inches wide, and stands from 17 to 19½ inches high. The backs come from 16 to 18 inches above the cushions, and are from 25 to 30 inches wide from top to bottom. The waste of covering material on some of the wider backs, on account of their projection below the cushions, amounts to as much as half a square yard. This may be averaged at from 12 to 14 yards per car. Seat-arms are from 25 to 27½ or 28 inches from the floor.

The following are some of the points of a comfortable seat: It must be convex wherever it touches the person, as hollow curves are tiresome. The back should be convex, both horizontally and vertically, except where straight lines are used. The seat should be inclined, and there should be a good foot-rest.

Parlor-car chairs are even more objectionable. Nominally revolving, they interfere with each other, and are less comfortable than if fixed. They have most of the faults of the day-coach seats. The promising field for the inventor is in the seat of the day coach, and certainly he who devises and introduces a seat meeting the requirements of the case ought to be well rewarded financially.

Car-Coupling Tests in Michigan.

MR. WM. MCPHERSON, JR., commissioners of railroads of Michigan, has sent out the following circular in relation to his contemplated tests of automatic and safety freight-car couplers:

"The large number of letters received at this office making inquiry in regard to the test of automatic and safety freight-car couplers to be selected for use in this state, as provided by the enactment of 1885, seem to make necessary a supplemental circular to that issued by me under date of July 10th, 1885.

"Since the issue of that circular, the Master Car-Builders' Association, through its executive committee, has held a test at Buffalo, N. Y., at which more than forty prominent coupling devices were offered for trial of their merits. Of these, after a fair and thorough test, the committee selected twelve to be placed upon the cars of different roads, for a thorough working test through the next winter. Their performance will be closely observed, and results reported at the next meeting of the association, and from the twelve in all probability will be selected the devices to be adopted for use upon the cars of the companies represented by the committee. The officers of this department were present at the above mentioned test, and witnessed the performance of each coupler tested. By the courtesy of the committee they were also enabled to carefully note all details of interest and value, bearing upon the cost and construction of each device presented. It seems unnecessary to again go over the ground covered by the trial at Buffalo, and as a further general test would involve heavy expense to both parties presenting devices for trial, and the state, I have concluded to dispense with that contemplated by the circular of July 10th ult.

"There seems no room for doubt, that the recommendation of the executive committee of the Master Car-Builders' Association will determine the couplers with which the companies of the New England states, New York, Pennsylvania and Ohio, and the great trunk lines of the west, will equip their cars. With the roads of those sections especially, our own have the largest and constant interchange of traffic, and the best interests of companies and trainmen in their employ, alike demand that the couplers to be selected for use under the provisions of our law should be as nearly uniform with those adopted by the companies of the above-mentioned states as possible.

"But that parties interested and not present at the Buffalo test may not be excluded from fair recognition by this department, if upon presentation of their devices at this office I am of the opinion that their merits will warrant the incurring of the expense of a practical working test, I will so advise, and suggest a plan for carrying the same into effect, and will give such devices due consideration in making any selections of couplers under the law."

American Inventions upon the Locomotive.

THE temporized character of the early American railways and the severe conditions still enforced upon rolling-stock by the irregular alignment, heavy grades and elastic road-bed still in use on American railways, have, according to *Engineering*, presented difficult problems to the American engineers, and in the course of their solution many inventions have been produced which are essential here, and some of them generally applied on all locomotives. The non-condensing and high-speed engine of which the locomotive is merely one type, was invented by Oliver Evans in 1785, and the multitubular boiler was originated in 1788 by Nathan Reed, a judge in one of the Massachusetts courts, and patented by him August 26th, 1791. The pony trucks at the front of a locomotive were applied as a matter of necessity to the early locomotives on the Baltimore and Ohio Railroad by Gen. Isaac Trunbull. Ross Winans was anticipated in the invention of the swivel truck used on all American cars by a man employed on a granite (syenite) quarry in Quincy, Massachusetts, where a railway was used for transporting the stone to the tide water. Winans patented his invention, and his suit against the railway companies was defeated by the testimony of this quarryman, who never received anything beyond the legal fees as a witness for his valuable evidence. The inventions of Winans are numerous and important, among them being the bar frame, cylinders with projections allowing them to be bolted together at the centre, cast-iron wheels with chilled tread, and many mechanical details in every part of the engine. Thomas Rogers, of Paterson, N. J., first made the open cast-iron driving-wheels and applied counterweights to balance the connecting-rods, and also the expansion braces, to pre-

vent the expansion of the boiler from distorting the machinery. The air-chamber used on the pump was invented by W. MacQueen, of the works of the New York Central Railroad at Schenectady. Another important pump detail is the ground joints in pipe connections first made by M. W. Baldwin, who founded the locomotive works at Philadelphia known by his name. Another Philadelphia invention is the equalizing bars invented by Joseph Harrison in 1837. The American locomotive cab was first made by David Matthew, although far from its present complete form. No single invention has contributed so much to the close running of trains at high speeds, yet compatible with safety, as the automatic air-brake of George Westinghouse, Jr., of Pittsburgh. The application of a lamp with a parabolic reflector to throw the rays of light along the track is an American invention. In its general line and proportions, which go to make up the peculiarly "American" type of locomotive no one did more than Colonel William Mason, of Taunton, Mass., who exhibited in the design of many classes of machinery a degree of taste rarely found in mechanism, also conforming to the severe requirements of strengh and practical operation.

Changes in Note of Bell or Whistle.

THE change in note of the bell or whistle sounded on a rapidly passing train is very noticeable, and is thus explained in the *American Machinist:* Supposing two trains were running in opposite directions at 60 miles per hour each, and that the bell strikes when they are 1,156 feet distant. These trains would pass in about six seconds. It would require one second for the sound of the bell to reach the other train, so all the sound made in six seconds must be heard in five. A bell that gives alto *C*, vibrates 528 times per minute. Here are 3,168 vibrations heard in five seconds, which is at the rate of 633 per second, or not quite up to *D*, which require 660 vibrations. As the trains approach, the vibrations get nearer, and at the moment when the trains pass the vibrations are heard as they are made at the rate of 528 per second.

The rule holds good as the trains recede from one another. When they have traveled 1,156 feet, or six seconds, a person on either train requires seven seconds to get the whole number of vibrations given by the bell or whistle on the other train. This is equal to 452, or almost down to *B*, which requires 462 vibrations per second.

The Storm King Bridge.

A MORTGAGE for $6,000,000 has been filed in the clerk's office of Orange county, N. Y., signed by Chauncey Vibbard, president of the New England and Southern Railroad Company, to the Central Trust Company of New York as trustee. The mortgage covers the entire line of road, including the bridge over the Hudson river at Storm King, from a connection with the New York, Lake Erie and Western Gray Court Branch to a connection with the Harlem and New York and New England roads at Brewsters, N. Y., twenty-six miles of road.

The Phœnix Bridge Company has contracted to build the bridge and road. It is understood that four prominent railway men will take seats in the board of directors within the next ten days, and that the bonds will be taken by a syndicate now in course of formation. The bridge will be 235 feet above high-water mark, and will be the greatest cantilever bridge in this country. The Phœnix Bridge Company will begin operations as soon as possible, and will push the work to an early completion.

The Era of New Fuels.

THE revolution produced by the discovery and introduction of natural gas is only equaled by the rush for appliances for the production of other forms of cheap fuel. Within the past fortnight, organizations have been effected at New York City for the purchase of all descriptions of refuse oil residuums; at Troy, N. Y., for the manufacture of fuel-gas; at Cleveland, for the utilization of oil residuum; at Pittsburgh, for the manufacture of water gas on the Dawson (English) principle, and at Chicago, for the burning, in stoves and under boilers, of crude petroleum. In this connection, we learn, says the *Iron Trade Review*, that the Chicago enterprise is but a part of an extensive movement, emanating from the Pacific coast, for the introduction of oil-burning appliances under what are known as the Jones patents.

English inventors appear to be traversing much of the same ground already gone over on this side of the ocean. The London *Iron Trade Exchange*, for instance, devotes an article to a description of the method devised by Colonel Sadler, managing director of Sadler & Co., chemical manufacturers, of Middlesborough, by which the residuary oils from coal tar products are utilized for the heating of boilers. Although this device has cost Col. Sadler several months' experimenting, it is not apparent that he has gotten much beyond the ordinary steam-jet atomizer familiar to American experimenters in the same line. But the fact is significant as showing the attention paid to this important subject in a country remote from oil-producing districts, and it is especially significant because of the claim that the new fuel can be furnished at a lower cost than English coal.

Competitive Tests of Automatic Freight-Car Brakes.

THE committee on automatic freight-car brakes of the Master Car-Builders' Association have issued the following notice:

The Master Car-Builders' Association Committee on Automatic Freight-Car Brakes invite the manufacturers of such brakes to a competitive test to be held at Burlington, Iowa, on December 14th, 1885, and on May 14th, 1886. The condition of the tests will be as follows:

1. Each brake company to furnish, fitted with its device, fifty 28 or 30 feet box-cars of 40,000 pounds capacity, delivering the same to the committee free of charges at some point on the Chicago, Burlington and Quincy Railroad, on or before December 7th, 1885, and leave them in the hands of the committee till after the trial of May, 1886.

2. The owners of the brakes will be reponsible to the car owners for mileage made from December, 1885, to May, 1886. Between the trials the equipment will be kept on the lines of the Chicago, Burlington and Quincy Railroad, and that company will be responsible for any damage occuring to it while on its lines that come under the rules of the Master Car-Builders' Association.

3. The December tests will be made while the brake attachments are new and in good condition. No brakes will be allowed on the engine, and hand-brakes only on the tank. Mechanical appliances for operating the car-brakes from the engine or tank will be allowed. The brakes must be fitted to both trucks and with plain cast-iron shoes. Other details of the trial will be such as may be presented and agreed upon by the committee prior to the trial.

4. After the December trial the brakes will be put into general service, receiving only ordinary repairs—a careful record of the cost of which will be kept. In May, 1886, the cars will be called in, and, without being prepared for trial, the December tests will be repeated.

G. W. RHODES, Chairman.
GEORGE HACKNEY,
BENJAMIN WELSH,
JOHN S. LENTZ,
W. T. HILDRUP,
Committee.

NOTE.—The Committee will not provide equipment for these tests. Three or more competitors will be required before the tests will be entered into. Any brake company desiring to compete should at once communicate with the chairman of the committee, whose address is Aurora, Ill.

Prizes For Railway Improvements.

THE German Railway Union has recently awarded prizes in accordance with an offer which it made in 1883 for inventions and improvements, methods of office work, statistics, and books on railway topics, brought out during the six years, ending July 15th, 1884. Richard Schwarzkopf, of Berlin, received $729, as a prize for a safety apparatus for steam-boilers; Herr Heinde, of Vienna. the same amount, for his system of iron cross-ties; Herr Schrabetz, of Vienna, $364, for his rail-bending machine; Herr Mahla, of Bavaria, $729, for hose-coupling for steam-heating apparatus for cars; Herr Sedlaczek, of Austria, $364, for an electric head-light; Herr Ulbrecht, of Saxony, $364, for a manual calculating traffic statistics; Brosins & Kock for their work entitled "School of the Locomotive;" Prof. Frank, of Hanover, for his "Treatise on the Resistance of Locomotive and Trains, Water and Coal Consumption, and the Work of Locomotives."

Railways in Alabama.

THE length of completed railway track now in operation in Alabama, including main line and side-track, is 2,182 miles, of which 960 miles are laid with steel rails. One hundred and sixty-four engines are in use on the Alabama roads, together with 87 passenger-cars, 27 baggage, mail and express-cars, and 2,695 freight-cars. The total capital investment is $73,013,319, the actual cost of the roads and equipments being $63,693,690. The number of miles traveled by passenger-trains during the past year was 1,520,512. During the same time freight-trains ran 2,725,753. The 1,269,504 passengers carried traveled 56,976,957 miles, and their tickets cost them $1,510,073. The freight moved amounted to 2,654,454 tons, for which the roads charged $4,613,620. The roads paid interest on bonds to the amount of $1,818,604, and declared dividends amounting, all told, to only $130,000. It will be seen that the number of passengers carried about equals the population of the state.

A Strategic Railway.

RUSSIA is building a strategic railway to the Austrian frontier. A strategic railway is not difficult to make, according to the London *Railway and Tramway Express*. The promoter buys a right-of-way from the farmers for an annual pass, then gets all their land condemned and takes up the passes, then gets a state grant of two or three districts for the directors, buys its iron on long time, and pays for its grading with construction bonds, then issues equipment bonds to pay for rolling-stock, borrows all the money in the country on the mortgages, calls in everything outstanding and exchanges it for a deficit—then changes its name.

MR. THEODORE VORHEES having resigned the position of superintendent of the Saratoga and Champlain Divisions of the Delaware and Hudson Canal Company, and the several divisions composing the Northern Railroad Department, viz.: Suesquehanna, Utica, Saratoga and Champlain, having been consolidated, Mr. C. D. Hammond has been appointed superintendent. The office of secretary of the Northern Railroad Department is abolished, and Mr. J. White Sprong is appointed comptroller and purchasing agent.

INTERESTING particulars continue to arrive from Russia of the progress of the railway that is being hurried on to the new position Russia has acquired on the Afghan frontier. The electric light having broken down owing to an accident to the apparatus sent, the men are working at night by the aid of hundreds of lanterns and huge fires fed with petroleum refuse. As far as Askabad the road has been levelled, and it is expected that the final rail will shortly be laid.

THE Pennsylvania Railroad Company is about to engage in the reduction of grade-crossings on its New York division. This is to apply to every point on the line, and it is believed that this will enable the company to reduce the time to Jersey City at least half-an-hour. The work will be very expensive, but the company will be compensated for it by the time saved, and the expense avoided in paying damages.

THE projected Maryland and Delaware ship canal is to be 17 miles long, 171 feet wide at the surface and 99 feet wide at the bottom. It will be 27 feet deep. To build this channel will require the dredging of 43,000,000 cubic yards of earth. Machines will be used that will lift from 10,000 to 15,000 cubic yards per day. The canal will cost $8,000,000.

MR. WILLIAM G. VAN BUSKIRK has resigned his position as master mechanic and master car-builder of the Newburgh, Dutchess and Connecticut Railroad, after serving acceptably in those capacities for seventeen and eight years respectively, and has been succeeded by Mr. Gilman D. Holmes.

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RAILWAY RECEIVERSHIPS.

THE two receivers of the West Shore road have modestly preferred their claims for $700,000 compensation for eighteen months' service in their official capacity. The judge in whose court the receivership proceedings were instituted had fixed their compensation at $40,000 each, determining this sum as the highest paid as salary to any railway official in the country. But the two receivers were not satisfied with any such trifling sum as $40,000, and applied for the noble sum of $700,000 as being their just due under a ridiculous act of the New York legislature known as the HAGGERTY Act. By the provisions of this act receivers are allowed, as compensation, five per cent. of the first hundred thousand dollars actually received and paid out, and two-and-one-half per cent. upon all sums received and paid out in excess of the before-mentioned one hundred thousand dollars. The clumsy legislator who framed this act and the equally clumsy legislators who voted for its passage, were doubtless prompted by a desire to limit the compensation of receivers and cheapen the cost of settlements by the courts. But, as might be expected when august legislators are generally a set of inflated numskulls, the act in question defeated its very purpose and gave a legal color to the most extortionate demands of the army of receivers. The receivers of the West Shore have the law upon their side, and the award of the judge is to be contested in the Court of Appeals.

Now it strikes us that $25,000 per annum each, which was the allowance made by Judge BROWN, is ample compensation for the receivers' services. It is the highest salary paid by any solvent railway to any of its officials, and should certainly be considered sufficient to compensate the two gentlemen who have managed the finances of the West Shore for the past eighteen months. But the same strange perversion seems to have possessed these gentlemen that possesses every receiver of an insolvent corporation—that a receivership is the signal for reckless and wanton extravagance; to imagine that to a receiver money should be no object, and that what would be imprudent in the conduct of a solvent corporation, would be merely shrewd management in the conduct of a bankrupt concern.

At present there are a dozen leading lines of railways in this country under the management of receivers, and it is safe to say that of this dozen the majority are engaged, in the most reckless and prodigal manner, in leasing other roads, branching out into new fields, conducting their affairs on a scale of generosity and magnificence, and "booming" things generally, as if the treasuries behind them were limitless. Yet these railways have been forced into the courts through their crippled financial condition and have been put into the hands of receivers—for what?

To our way of thinking—it is an old-fashioned way, but we stick to it nevertheless—a corporation is put into the hands of a receiver for one of two purposes: Either that the affairs of the concern may be wound up with the utmost expedition and economy, or, in event of its resuscitation being possible, that its affairs may be conducted with such conservatism and watchfulness of expense, that it may be returned to its original management in a healthy condition and in as soon a period as possible. It is unnecessary to state how great is the perversion from this original idea of receiverships. The position of receiver is now sought as one seeks a lottery ticket—for its possible chances. The record of recent receiverships, and especially of railway receiverships, shows that economy and conservatism have been the last things thought of, and that the era of receivership is an era of wild speculation and of reckless extravagance. Surely it is about time that some other method were sought to conduct the affairs of an insolvent corporation.

THE PHILOSOPHY OF ACCIDENTS.

WE publish this month the third of Mr. WM. S. HUNTINGTON'S admirable series of articles on the subject of the prevention of railway accidents. The author knows what he is writing about and has devoted years of study to the problems he discusses; and doubtless were all his recommendations put in force there would be a sensible diminution in the frequency of railway disasters. But is it possible to reduce railroading to such a perfect system that accidents will never occur? We fear not. There are too many elements at war with each other—too many conditions beyond the scope of human control—for us ever to attain such a blissful state of affairs.

There is not, probably, any railway in the country more admirably conducted with a view to the avoidance of accidents than the Pennsylvania Railroad. The most approved signal systems are in use, the greatest care is exercised in the selection of its employés, the most rigid and practical rules are enforced, and it would seem that an accident on the lines of that road would be well-nigh an impossibility. Yet on the 18th of last month three trains were hurled upon each other and a number of lives were lost at a point on the road where extra provisions for safety had been adopted. And the cause of this dreadful disaster was traced to the incomprehensible absent-mindedness of a reliable signal-operator. It is well enough to punish this unfortunate man, and doubtless such punishment is a necessity as an incentive to care and watchfulness on the part of signal-operators and other railway employés in whose keeping are the lives of the traveling public. But the whole record of the operator in question shows conclusively that he was one of the most trustworthy in the employ of the company, and possessed as high a degree of reliability as could be expected to be attained by a human being—and that is the weak point. It is impossible for any man to prove infallible; for him to maintain, year in and year out, a machine-like precision coupled with reasoning action.

It needed but a few years of railroading to demonstrate that infallible trust could be reposed in no one single man. With all a man's intelligence, his uniform attention to duty, the time would occur when temporary abstraction, either caused by sudden physical ailment or by unexpected and unpremeditated diversion of thought from the business of the moment, would bring about a catastrope appalling in its results. The attention of railway officials was then directed to the invention and application of mechanical devices—unreasoning, unvarying machines that would in every case record the necessary signals—and care was even taken that should these devices, through failure of the connecting mechanism, be unable to perform their functions, the failure would indicate danger. Positive and correct action alone indicated safety. But the railways had only escaped from Scylla to be entrapped by Charybdis. The dull, unvarying machine could only act according to one unvarying rule. It could not reason and had no responsibility. Occasions would occur when a suspension of the rules was a sudden and imperative necessity—when unforseen emergencies arose that upset previous calculations—and to perform the service necessary the machine required what it had not—a power to think.

It became evident that there was little to choose between the intelligent, but rarely erring man, and the reasonless, but reliable machine; and the evolution of railway service finally brought to action the seeming perfect combination of the two. The mechanism was trusted to perform the unvarying, reliable portion of the service and the intelligent man the reasoning portion. Greater precaution could not and never can be devised, and the Pennsylvania road was among the first to adopt this dual system. And yet the disaster of last month occurred in the face of such precautions, and its recurrence is not impossible. The mathematical chances of the mechanical and the reasoning elements of the system both failing at the same moment are infinitesimal, and consequently need not be considered as existing; but the accident in question was caused by the deliberate error of the operator—an error not of omission but of commission, and against such catastrophes there is absolutely no safe-guard. At first thought it would seem that had two operators been required to be at the signal-station instead of one, and had both been required to observe the signals before the second train had been given permission to proceed, the chances of the accident would have been lessened. But, upon reflection, it is easy to see that the presence of two men, on the other hand, would have resulted in a perpet-

ual interchange of conversation that would have militated against the benefits of extra safety.

So long as there are railways there will be accidents. Human wisdom can take every precaution, can leave no stone unturned to discover the surest and safest means to provide for every emergency. But so long as mere mechanism is without reasoning power, and so long as human nature is liable to periods of weakness, so long will there be failures to meet the urgencies of railway service. And mechanism will always be reasonless, and human nature will always be liable to err. It is only in the lessening of chances that the railways can provide against disasters, and accidents will occur despite the utmost precautions to prevent them. Therefore, knowing that a class of accidents exist which may be classed as unpreventable, so much greater is the responsibility of the railways for the occurence of accidents that are preventable by the exercise of proper precaution and the employment of approved safety devices.

EDITORIAL NOTES.

FOR the first six months of the present year the total new railway construction in the country is announced to be but 895 miles. Previous experience would teach that upon this basis the total construction during the year would not exceed 2,500 miles, which would place the record below previous records for many years back. But despite this, the showing is a good one. It is an indication that railways are awakening to the fact that good things may be overdone—that they realize the wholesomeness of the maxim *festina lente*.

* * *

AS we go to press we learn of the sale of the West Shore road to Messrs. CHAUNCEY M. DEPEW, J. PIERPONT MORGAN and Judge ASHBEL GREEN for $22,000,000. In opening the sale it was announced that no bid of less than $22,000,000 would be received, and that $750,000 of the purchase money must be paid on the day of sale and the balance on or before December 15th. There was no other bid. One chapter in the history of this singular road is now ended, but an interesting career is still before it. The purchasers disclaim that the road was bought in the interests of the New York Central, but there will be many persons who will receive this disclaimer with doubt and suspicion.

* * *

AT last one vexed question is settled in the traffic agreement between the Baltimore and Ohio and the Staten Island Rapid Transit Company by which the former is to reach New York over an independent line from Bound Brook, N. J., crossing to Staten Island by a bridge, and then running on the Island company's tracks. At least this is the programme, but it is liable to sundry interruptions. If we are not greatly mistaken, the good people of New Jersey are rather "sot" in their views concerning a Staten Island bridge, and incline to the belief that such a structure would act to the detriment of state interests. Furthermore, they are inclined to believe, and their belief is geographically sustained, that by rights Staten Island should belong to Jersey. If New York will surrender the island to New Jersey the people of the latter state will raise no opposition to the construction of bridges to the main land, but they certainly do object to the island being prospered at Jersey's expense.

* * *

AND now the Master Car-Builders' Association, having temporarily exhausted the subject of car-couplers, will undertake the solution of the equally vexed problem of automatic freight-car brakes. The official announcement of the association will be found upon another page, and unquestionably the test will be conducted honestly and without favor. But the difficulty will be to convince the railway world that the successful competitors possess the best appliances. True, the brakes meeting with endorsement may be better than those which are left behind in the competition, but may there not be equally good appliances, the inventors or owners of which may be unable to comply wlth the requirements of the test and may not have the necessary means to enter their devices for competition? This same view of the case appears to have struck the commissioner of railroads of Michigan, who, recognizing the value of the car-coupler tests at Buffalo, has concluded to dispense with his intended test, but announces that those inventors whose couplers were not tested at Buffalo may have an opportunity of demonstrating to him the merits of their devices with a view to their possible endorsement.

* * *

THE "Short Hour League," an organization in England for the reduction in the hours of labor, have taken up the subject of railway service, and are endeavoring to have the working hours of railway employés lessened. In this country there is little need for agitation on this subject. Nearly all of the main lines recognize a plenitude of rest as absolutely essential to the care and watchfulness of its employés, and whatever may be the hardships of the latter they do not, except in unusual cases, have reason to complain of overwork. Still, there may be a few instances where the hours of railway employés are too long, and small mercy should be shown a road on which accidents occur through the physical and mental exhaustion of its operatives.

* * *

THE town of Pullman, Ill., was conceived and built in the most approved light of human wisdom. Comfort, perfect sanitation, educational facilities, proper recrea-

tive pursuits—all were considered; and the proprietors of the town thought they had ministered to every proper want on the part of their employés and consequent inhabitants. But it seems that discontent is prevailing there, and the restive American mind pants for a share in the government. This is very natural and patriotic, but we are forcibly reminded by it of an anecdote of the renowned BOB INGERSOLL. An Irishman, so INGERSOLL relates, was shipwrecked upon a foreign coast and was rescued by an inhabitant of the country. Upon regaining speech the castaway turned to his rescuer and feebly inquired, "Have yes a government here?" "We have," answered the native. "Thin," said the Irishman with increasing strength, "Thin I'm fornist it!"

* * *

THE completion of the Canadian Pacific Railway affords another means of interoceanic communication and should be hailed with pleasure. Our neighbors in Canada have shown commendable enterprise in the matter of railways, and the consummation of their greatest effort in this direction calls for hearty congratuulation from their adjacent and friendly nation.

* * *

AN English contemporary is urging the adoption of third-class sleeping-cars upon British railways, which is rather surprising in view of the fact that first-class sleeping-cars have not yet been generally run by the leading British lines, but, nevertheless, it is gratifying to note that our worthy friends across the water are beginning to lose their dread of American ideas and innovations. Ultimately, we may expect to see the American car the style in general use, and it is a fact that one or two such cars upon English roads have already met with favor.

* * *

IT is comforting to know that the standard gauge is now in almost universal use on American railways, and that the time has nearly arrived when a car may be run upon every mile of railway in the country without a change of trucks.

* * *

AN Irish railway has been boycotted. We rejoice to see that roads across the Atlantic are keeping abreast with the times and are being furnished with all the modern improvements.

"NOTES of Travel in Northern Europe," by the Hon. Charles A. Sumner, congressman-at-large from California in the forty-eighth congress, is the title of an unpretentious but exceedingly interesting little volume recording the author's ramblings in Denmark, Sweden, and other portions of Northern Europe, a year or two ago. The volume is written in a thorough American spirit of inquiry and contrast, and enters into the public and private life characterizing the countries through which the writer traveled, and fully repays a perusal. It is amply illustrated, and is published by Andrew J. Graham, at 744 Broadway, New-York, and is sold for $2.

THE November *Century* is replete with good reading and embellished with the usual amount of artistic engravings. The illustrations accompanying "A Photographer's Visit to Petra," by Edward L. Wilson, and "Living English Sculptors," by Edward Gosse, are—especially the latter—deserving of the highest praise, and a series of brief sketches on "Typical Dogs" is also furnished with numerous spirited illustrations. General Grant's paper on the Chattanooga Campaign is among the many valuable contributions of this number.

EDWIN ALDEN & BRO'S. "American Newspaper Catalogue," for 1885, is a handsome octavo volume of 900 pages, and contains a classified list of all publications in the United States and Canada, together with information concerning the towns of publication and particulars of the journals recorded. The system of cataloguing is simple and the work cannot fail to be of great benefit to advertisers.

CASSELL & CO.'S *Magazine of Art*, for Deeember, is fully up to previous numbers and among other interesting illustrated articles, contains a paper on "American Silver Ware," in which, for once, an English writer admits the superiority of American over home talent, in one branch of decorative art. *The Quiver* and the *Family Magazine*, issued by the same house, are excellent numbers.

A NEW journalistic candidate for railway favor is the *American Railroader*, published semi-monthly at 12 Vesey street, New York, at one dollar per year. It is devoted to the interests of "workers" and there is every indication that it will be conducted in a lively and progressive spirit.

THE first issue of *Light, Heat and Power*, the independent gas journal of America, is received. It is published in Philadelphia, and judging by the initial number, which is an admirable one throughout, it will prove a most valuable exponent of the uses of gas.

THE British Institution of Civil Engineers has recently published in pamphlet form an interesting paper by William Stroudley, on the "Construction of Locomotive Engines." An abstract of the discussion following the reading of the paper is appended.

The Cosmopolitan is the title of a new monthly journal published in New York. A number of interesting articles appear in the first numbers, and steady improvement is promised. It is published at 44 Broadway, for twenty-five cents per year,

Outing continues to forge ahead and fully merits recognition as one of the leading monthlies. Its latest issue shows steady and marked improvement, though improvement is rather hard to be imagined as applied to this publication.

The Graphic, published in Cincinnati, the only illustrated paper in the west, is a weekly journal of merit, and is a most creditable publication in both a literary and an artistic sense.

The Cook continues to appear weekly and proves the most appetizing yet tantalizing of publications.

Street-Railways.

American Street-Railway Association.

President.—Julius S. Walsh, President Citizens' Railway Company, St. Louis, Mo.

First Vice-President.—William White, President Dry Dock, East Broadway and Battery Railroad Company, New York City.

Second Vice-President.—C. B. Holmes, President Chicago City Railway Company, Chicago, Ill.

Third Vice-President.—Samuel Little, Treasurer Highland Street-Railway Company, Boston, Mass.

Secretary and Treasurer.—William J. Richardson, Secretary Atlantic Avenue Railroad Company, Brooklyn, N. Y.

Office of the Association, cor. Atlantic and Third Avenues, Brooklyn, N.Y.

The Fifth Annual Convention of the Association will meet in Cincinnati, O., on Wednesday, October 20th, 1886.

THE STREET-RAILWAY CONVENTION.

THE fourth annual meeting of the American Street-Railway Association has come and gone, and the street-railway world is the richer for a number of able papers on topics of vital interest and animated and fruitful discussions on matters relating to the construction and conduct of street-railways. Elsewhere we present a brief summary of the proceedings, and as quickly as possible will place in full before our readers the reports of the special committees on the various subjects allotted.

The meeting was a great success as it was bound to be. The attendance was large, the interest in the proceedings lively, and the care and attention of the St. Louis hosts unremitting, Eleven new roads were added to the membership and the financial condition of the association was stated to be satisfactory. Individually and collectively, as far as heard from, there was not an attendant at the meeting who did not feel that he was amply repaid for his presence.

Truly, the career of the American Street-Railway Association has been one continued era of prosperity. In 1882, when the small handful of street-railway representatives organized in Boston, there was no indication of the future success which was awaiting their efforts, but the necessity for the association existed, and while slow at first to acquire membership the street-railways of the country are fast learning that there is a wonderfully fertile field for investment in membership in the association which now numbers one hundred and thirty-seven of the most prominent street-railways in America as members. That this impression is gaining ground there is no doubt, and there is no reason why the next year should not see a still more marked increase in the membership.

The officers elected for the ensuing year are gentlemen well known to street-railway men, and earnest, zealous members of the association. The welfare of the organization can safely be intrusted in their hands. The printed minutes of the meeting will appear in due time as well as the reports of the committees in full. We regret that they are not in shape for us to publish in this issue, but they are of a kind that will keep and their publication will be pushed as rapidly as possible.

It is to be noted that the executive committee have announced that in future no reports, papers, etc., will hereafter be mailed to any persons not members of the association, and this is as it should be. The ridiculously small entrance fee and dues of the association enable any company to acquire membership, and if companies are perversely blind to their own interests and refrain from becoming members, there is no reason why the association should continue to recognize them by sending them the official documents of the association. The existence of the association is now assured, it has been sufficiently advertised, and those street-railway companies desiring to reap benefit from it know what to do.

The choice for a meeting place for next year's convention—Cincinnati—is a good one, and while the fourth annual meeting just passed was in every way a success we look to see it surpassed by that held on October 20th of next year

THE American Street-Railway Association have performed one most commendable act, which they have performed in years past, and which they may be relied upon to perform in years to come if we are not very much mistaken. They have re-elected, as secretary and treasurer, MR. WILLIAM J. RICHARDSON of Brooklyn, and they have done well. To the untiring energy of MR. RICHARDSON is due in great measure the prosperous condition of the association, and under his wise management it is rapidly growing in membership and wealth. He has proved a most efficient officer, and the association have appreciated his services.

THE "BOBTAIL" CAR.

BY A RETIRED OFFICIAL.

[Written for the AMERICAN RAILROAD JOURNAL.]

THE familiar street-car, drawn by one horse and without a conductor, and commonly designated the "bobtail" car, was unknown in my days of active street-railroading. And it is a great pity that we of a former generation did not avail ourselves of this simple means of abridging the expenses of street-railway operation. In our day if expenses had to be lessened we took off several cars and thus diminished the car accommodation—that was the only way we knew of.

The advent of the "bobtail" car put things on a different basis, and through its adoption a street-railway having a steady but comparatively small patronage can offer most liberal accommodation at comparatively small expense. Let us consider the daily savings effected by the "bobtail:" First, the conductor's wages ranging between one dollar and fifty cents and two dollars, and averaging about one dollar and seventy-five cents; second, the care of

one horse, including stabling, feed, etc., amounting to about fifty cents, and third, the saving in capital invested in one horse—averaging the cost of the horse at $150 and his car-life as three years, which is a fair estimate—amounting to about twenty-five cents, or a total daily saving on the three items of $2.50. Now on a street-railway of moderate operation, running twenty cars, here is a a daily saving of $50; no inconsiderable item. It is rare that a road running but twenty cars is burdened with so great a patronage that a "bobtail" car will not hold comfortably all the passengers that will board it, and, therefore on the score of capacity there can be no exception taken.

Now again, a road running say ten cars, which is not uncommon in small cities, by changing their two-horse cars for "bobtails" can effect a saving of $25 per diem, and this saving in expense, if devoted to the betterment of the car accommodation, would add three or four more cars to the regular service and the public would be just so much benefited in their accommodation. A five-mile road operating but ten cars cannot run them at a greater headway than twelve minutes, assuming that the round-trip takes two hours, including stoppages and rests at the termini, which twelve minutes make a pretty long interval between cars. By the adoption of "bobtails," and at no greater expenses of operation, the car service can be increased and cars may be run upon nine or ten minutes headway. It may be urged that the cost of additional cars is not here taken in consideration, but the cost of a "bobtail" is considerably less than that of the ordinary two-horse car, so much so, in fact, that fifteen "bobtails" would cost no more than ten two-horse cars, so this argument falls to the ground.

Now, will some one kindly inform me why, in the light of these incontestable facts, the "bobtail" is meeting with such fierce opposition from the traveling public, and why it is not infrequently the case that their operation is prohibited by city ordinance? By the traveling public it is generally claimed that the deposit of fares in a fare-box at the front of the "bobtail" by the passengers themselves is a nuisance. Well, it may be, but it is certain that devices can be and have been provided whereby the passengers can deposit their fares without leaving their seats, which would entirely obviate this objection. It is further claimed that the driver of the "bobtail," having his attention occupied with the care of his horses, cannot perceive the signals made by persons on the sidewalks. This, I think, is a foolish objection. Beyond the ordinary care necessary to keep his horse in steady motion and to avoid obstacles, the driver can devote his attention to the signals of would-be passengers quite as assiduously as the conductor on the two-horse car, whose time is greatly occupied in passing through the car to collect fares. The driver of the "bobtail" is always on the front platform of the car and has an unobstructed view ahead of him. I should certainly think his facilities for observing the signals of passengers quite as good as those of the average two-horse car conductor.

Altogether it is a mystery to me why the traveling public are so strenuous in their opposition to the "bobtail" system, which enables a road to furnish increased car service without increase of fare, and to furnish an accommodation in a small city quite equal to that in a large city where the daily receipts from passengers are much greater. Perhaps the ungrateful public will and sometimes do appreciate the absurdity of their opposition, when after a city ordinance has been passed restraining the operation of "bobtail" cars their facilities for street-car travel are lessened while they gain nothing. At least one person I know of has admitted that after he had successfully fought the "bobtail" car and its disappearance had been followed by a reduction of the car service on the particular road he patronized, he obtained but one benefit—the realization that he had been a fool; a useful but not comforting realization.

THE FOURTH ANNUAL MEETING OF THE AMERICAN STREET-RAILWAY ASSOCIATION.

THE fourth annual meeting of the American Street-Railway Association was convened at the Southern Hotel, St. Louis, Mo., on Wednesday, October 21st, and remained in session for three days. The meeting was called to order by the President, Mr. Calvin A. Richards (president, Metropolitan Railroad Company, Boston, Mass.), and the following delegates of members were reported present:

Highland Street-Railway Co., Boston, Samuel Little, treas.; J. E. Rugg, supt.

Lynn and Boston Railroad Co., Boston, Philip A. Chase, director.

Metropolitan Railroad Co., Boston, C. A. Richards, pres.; I. Randall, supt. car-construction.

Brockton (Mass.) Street-Railway Co., Horace B. Rogers, supt.; C. J. Kingman, director.

Atlantic Avenue Railroad Co., Brooklyn, N. Y., Wm. Richardson, pres.; W. J. Richardson, sec.

Brooklyn City Railroad Co., Wm. H. Hazzard, pres.

Bushwick Railroad Co., Brooklyn, W. N. Morrison, supt.

Buffalo East Side Railway Co., S. S. Spaulding, pres.

Buffalo Street-Railway Co., Henry M. Watson, pres.

Chicago City Railway Co., H. H. Windsor, sec.; T. C. Pennington, treas.

Chicago West Division Railway Co., James K. Lake, supt.

North Chicago City Railway Co., V. C. Turner, pres. and supt.; Jacob Rehn, vice-pres.; Augustine W. Wright, supt. of track-construction.

Cincinnati Street-Railway Co., A. G. Clark, vice-pres.; John Harris, supt.; Benj. F. Houghton, pur. agt.

Mount Adams and Eden Park Inclined Plane Railway, Cincinnati, G. B. Kerper, pres.

Superior Street-Railroad Co., Cleveland, F. De H. Robison, pres.

Brooklyn Street-Railroad Co., Cleveland, A. J. Moxham, vice-pres.

East Cleveland (O.) Street-Railway Co., H. A. Everett, sec.; G. E. Herrick, director.

Woodland Avenue and West Side Street-Railway Co., Cleveland, J. B. Hanna, sec.; J. F. Card, director.

Columbus (O.) Consolidated Street-Railway Co., A. D. Rodgers, pres.; E. K. Stewart, sec.

Newport and Dayton Street-Railway Co., Dayton, Ky., W. W. Bean, pres. and supt.

Dayton (O.) Street-Railway Co., J. W. Stoddard, pres.; A. W. Anderson, supt.

Oakwood Street-Railway Co., Dayton, O., Chas. B. Clegg, pres.

Denver (Col.) City Street-Railway Co., D. F. Longstreet, director.

Easton (Pa.) and South Easton Passenger Railway Co., H. A. Sage, pres.

Globe Street Railway Co., Fall River, Mass., John H. Bowker, supt.

Hartford (Conn.) and Wethersfield Horse-Railway Co., E. S. Goodrich, pres. and treas.

Citizens' Street-Railroad Co., Indianapolis, Tom L. Johnson, treas.

Jersey City (N. J.) and Bergen Railroad Co., Charles B. Thurston, pres.; E. F. Brooks, engineer.

Lexington (Ky.) City Railway Co., John Cross, pres.

Steinway and Hunter's Point Railway Co., Long Island City, N. Y., Chas. J. Campbell, supt.

Louisville (Ky.) Central Passenger Railway Co., Thomas J. Minary, vice-pres.

Louisville (Ky.) City Railway Co., H. H. Littell, supt.

Lowell (Mass.) Horse-Railroad Co., J. A. Chase, gen. man.

Clinton and Lyons Horse-Railway Co., Lyons, Ia., R. N. Rand, vice-pres.

Memphis (Tenn.) City Railroad Co., R. Dudley Frayser, pres.

Minneapolis (Minn.) Street-Railway Co., Thos. Lowry, pres.; C. G. Goodrich, sec.

Mobile (Ala.) City Railroad Co., John Maguire, pres.; M. Frohlichstein, director.

New Albany (Ind.) Street-Railway Co., Mrs. L. V. Vredenburgh, treas.

Central Park, North and East River Railroad Co., New York, C. Densmore Wyman, vice-pres.; J. L. Valentine, treas.

Dry Dock, East Broadway and Battery Railroad Co., New York, Wm. White, pres.

Omaha (Neb.) Horse-Railway Co., W. A. Smith, supt.

Central City Horse-Railway Co., Peoria, Ill., H. R. Woodward, pres.; Elliot Callender, treas.; Jas A. Smith and Joseph Elders, directors.

Fort Clark Horse-Railway Co., Peoria, Ill., J. H. Hall, pres.

Lombard and South Streets Passenger Railway Co., Philadelphia, John B. Parsons, pres.

Pittsburgh, (Pa.) Allegheny and Manchester Passenger Railway Co., C. Atwell, pres.; J. T. Speer, man.

Pittsburgh (Pa.) and Birmingham Passenger Railroad Co., W. W. Patrick, pres.

Pittsburgh, (Pa.) Oakland and East Liberty Passenger Railway Co., J. T. Gordon, pres.

Union Railroad Co., Providence, R. I., D. F. Longstreet, vice-pres.

Belle City Street-Railway Co., Racine, Wis., Chas. Hathaway, treas.

Rochester (N. Y.) City and Brighton Railroad, Co., C. C. Woodworth, sec.

Saginaw (Mich.) Street-Railway Co., F. G. Benjamin, supt.

Naumkeag Street-Railway Co., Salem, Mass., Chas. Odell, pres.; Wm. B. Ferguson, supt.

Salem (Mass.) and Denver Street-Railway Co., Benjamin W. Russell, pres.; Thos. H. Johnson, director.

Salt Lake City (Utah) Railway Co., Orson P. Arnold, supt.

City Railway Co., San Francisco, Cal., O. W. Meysenberg.

Sioux City (Ia.) Street-Railway Co., F. T. Evans, jr., sec.

Citizens' Street-Railway Co., Springfield, O., D. W. Stroud, pres.

Benton-Belfontaine Railway, St. Louis, Mo., J. G. Chapman, pres.; Chas. Parsons, vice-pres.; Robert McCulloch, sec.

Citizens' Railway Co., St. Louis Mo., Julius S. Walsh, pres.

Lindell Railway Co., St. Louis, Mo., John H. Maquon, pres.; John H. Lightner, vice-pres.

Missouri Railroad Co., St. Louis, Mo., P. C. Maffit, pres.

People's Railway Co., St. Louis, Mo., Chas. Green, pres.

Southern Railway Co., St. Louis, Mo., E. R. Coleman, pres.; W. L. Johnson, gen. man.

St. Paul (Minn.) City Railway Co., Thos. Lowry, pres.

Toledo (O.) Consolidated Street-Railway Co., J. E. Bailey, pres.

Troy (N, Y.) and Lansingburg Railway Co., Charles Cleminshaw, vice-pres.

Delegates from the following new roads acquired membership on behalf of their companies:

Cream City Railroad Co., Milwaukee, Wis., Winfield Smith, pres.

Newburyport and Amesbury Horse-Railroad Co., Newburyport, Mass., E. P. Shaw, lessee.

Kansas City Cable Railroad Co., Kansas City, Mo., Edward J. Lawless, supt.

St. Louis Railroad Co., St. Louis, Mo., Christian Peper, pres.

Washington and Georgetown Railroad Co., Washington, D. C., Henry Hunt, pres.

Cass Avenue and Fair Ground Railroad Co., St. Louis, Mo., W. R. Allen, pres.

Union Depot Railroad Co., St. Louis, Mo., John Scullin, pres.

Dayton Street-Railroad Co., Dayton, O., A. W. Anderson, supt.

South Boston Railroad Co., Boston, Mass., Daniel Coolidge, supt.

Des Moines (Ia.) Street-Railway Co., M. P. Turner, pres.; M. A. Turner, treas.

St. Clair Street-Railway Co., Cleveland, O.; Chas. Hathaway, pres.; M. S. Robison, sec.

Letters were also read from a number of street-railway officials regretting their inability to be present.

The reading of the minutes of the preceding convention was dispensed with and they were adopted as printed, at the conclusion of which President Richards addressed the convention at length, congratulating the association upon its prosperous condition.

The report of the executive committee was then read and adopted. The report stated, among other facts, that the association now numbered one hundred and twenty-five members, an increase of fifty over the number enrolled at the opening of the previous convention, and outlined the work carried out by the committee during the year, together with mention of the new organizations effected for the benefit of street-railways.

The report of the treasurer was then read, showing that the receipts during the year had been $3,212.60 and the expenses $2,471.96, leaving a balance on hand of $740.64.

On behalf of the St. Louis roads, Mr. Julius S. Walsh (president, Citizens' Railway Company,) invited the delegates to attend the Exposition in the evening, and to take a drive through the fair grounds on the following day, and to partake of a lunch, which invitation was accepted with the thanks of the convention.

Reports of special committees were then submitted, on the following subjects:

"Diseases Common to Car-Horses, and Their Treatment," "Progress of the Cable System of Motive-Power," "Progress of Electricity as a Motive-Power," "Repairs of Tracks," "Rules Governing Conductors and Drivers."

These reports, which will appear later in the JOURNAL, were the subject of interesting discussions and the time of the convention was chiefly taken up in the treatment of the important problems they presented.

The report of the special committees on "Ventilation, Lighting and Care of Cars," was not submitted, but the subject was thoroughly discussed.

On the afternoon of the last day the following officers were elected for the ensuing year:

President, Julius S. Walsh (president, Citizens' Railway Company, St. Louis); First Vice-President, William White (president, Dry Dock, East Broadway and Battery Railroad Company, New York); Second Vice-President, C. B. Holmes (president, Chicago City Railway Company); Third Vice-President, Samuel Little (treasurer, Highland Street-Railway Company, Boston).

Secretary and Treasurer, William J. Richardson (secretary, Atlantic Avenue Railroad Company, Brooklyn).

Executive Committee, C. A. Richards (president, Metropolitan Railroad Company, Boston); John Kilgour (president, Cincinnati Street-Railroad Company); John Maguire (president, City Railroad Company, Mobile, Ala.); T. W. Ackley (president, Thirteenth and Fifteenth Streets Passenger Railway Company, Philadelphia); C. C. Woodworth (secretary, Rochester (N. Y.) City and Brighton Railroad Company).

On motion, thanks were extended to the retiring president, and to the secretary and treasurer for their efforts in behalf of the association, to the St. Louis companies for the hospitality extended to the delegates, to the press and to the officers of the fair grounds.

The retiring president then introduced his successor, who addressed the convention briefly, after which the meeting adjourned to reconvene in Cincinnati, on Wednesday, October 20th, 1886.

On Friday evening, the annual dinner of the association was held at the Southern Hotel. The newly-elected president, Mr. Julius S. Walsh, presided, and a number of toasts were drunk with appropriate responses.

A Heavy Street-Railway Mortgage.

THE various street-railway companies of Newark, N. J., now under the presidency of Mr. S. S. Battin, have been consolidated under the title of the Essex Passenger Railway Company, and that company recently placed on file

in the county register's office a mortgage for $1,800,000 to Edward Q. Keasbey and George G. Frelinghuysen as trustees for the bondholders to secure thereon the bonds of the roads. The mortgage covers all the real and personal property, including cars and horses, tracks, franchises, buildings, etc., of the Orange and Newark Horse-Car Railroad Company, including the Clinton avenue, Orange, Belleville, and Market-street lines, and also the same property of the Newark and Bloomfield line, the Irvington line, and the Essex and Hudson Railway Company (the East Newark line).

A Street-Railway in Yonkers.

THERE was a meeting on October 26th of the incorporators of the Yonkers and Mount Vernon Railroad. They made application to the board of trustees for permission to lay their tracks in the village to connect with the road from Yonkers. This is a rival of the Mount Vernon and East Chester Company, and there is every indication of a lively time about it. The Mount Vernon Company have already commenced to build the road and they accuse the new company of attempting to get possession of the streets so as to cut them off. On the other hand the new company claim that all they want is a short connection at West Mount Vernon, but want full power given them in case of need hereafter.

Street-Railways in the Russian Capital.

THERE are now in St. Petersburg 70 miles of street-railway, operating 395 cars, drawn by 2,000 horses and 9 locomotives. The combined lines carry 51,000,000 passengers yearly. The first street-railway in St. Petersburg was constructed in 1873, and the growth of street-railway operation in that city has been marked.

A Singular Title.

THE word "bond" has been put to a curious use in Brazil. "When street-cars were first introduced in Rio de Janeiro by some American capitalist," says a correspondent of the Boston *Advertiser*, "the bonds of the company were first offered on the market. The bonds were floating about and everybody talked of them, but the horse-car, or rather mule-car, did not appear. At last they arrived, soon became popular, and are now known as 'bonds' all through the empire, not merely in Rio Janeiro, but at Para, Pernambuco, Bahia and in all the cities."

A New Form of Car-Wheel.

A NEW form of wheel for street-cars, designed with the object of overcoming the severe friction of the ordinary rigid wheels in passing round short curves, has been under trial at Northampton, Englnnd. The wheel has a loose steel tire working on ball rollers around an inner wheel, which is fixed to the axles in the ordinary way. This loose tire can revolve faster or slower than the inner wheel, thus giving freedom to the wheel which has to travel the outer or longer sweep of the curve. Several gentlemen recently accompanied Mr. Elliott, the manager of the Tramways Company, to witness the experiment, and all agreed in approving the marked difference felt in the movement of the car round curves, and noticed with pleasure the ease with which the horses took corners that have hitherto been a great strain upon them. The wheels were tested as to the brake-power that could be applied. Three men pushed a car out of the company's depot round the awkward curves, while with the old wheels six men are required for the purpose. A great saving is anticipated from the fact that only the steel tires will require renewing, and that these can be attached in five minutes.

STREET-RAILWAY NOTES.

THE certificate of incorporation of the Fifth Avenue Omnibus Company, which proposes to run omnibuses in Fifth avenue and elsewhere in this city. was filed on October 26th in the county clerk's office. Its capital stock is $500,000, divided in 1,000 shares of $50 each. Its incorporators are: Charles E. Lawyer, William C. Mifflin, Francis J. Arend, George G. Crosby, Charles L. Work, Joseph H. Reall, and Edward Vernon.

A STREET-RAILWAY on King street, Charleston, S. C., is the subject which is now engrossing the attention of the leading merchants on that favorite thoroughfare. It is now proposed that some enterprising syndicate shall run a surface line of railway from the west end of Broad street to King, and up King to Calhoun, where close connection will be made with the present King street line.

AT the recent annual meeting of the consolidated elevated railways of New York City it was shown that during the past year 103,354,729 passengers had been carried. The gross income was $7,000,561, and the operating expenses $3,719,492. This showing demonstrates that there have been nearly one hundred passengers for every inhabitant of the city.

CHARLOTTE, GA., is soon to have a line of street-cars propelled by electricity instead of by horses. The line is to be built by a Chicago firm, who will furnish the electric engines to propel the cars. Work, it is said, will soon be commenced.

THE Nahant (Mass.) Street-Railway Company has just been incorporated with a capital of $100,000, for constructing and operating a line of over four miles from the Lynn line to Nahant. Electricity as a motive-power may be used.

THE Citizens' Street-Railway Company, of Memphis, Tenn., has been incorporated with a capital stock of $250,000. Right-of-way has been granted the company for four routes in the city of Memphis.

THE Lincoln (Neb.) Street-Railway Company have commenced laying track on Eleventh street, They will go north to R street and then east on R street, but how far has not yet been determined.

IN the department of New Inventions of this month's JOURNAL will be found the description of an endless-chain railway curve for cable roads.

A STREET-RAILWAY will be built at Seguin, Texas. It is to be one mile and a quarter long, and to extend from the town to the depot.

A STREET-RAILWAY company has been organized at Salina, Kan., and the service will be in operation within six months.

New Inventions.

Whipple's Railway-Tie and Rail-Fastening.

LEANDER E. WHIPPLE, of Hartford, Conn., is the inventor of an improved railway-tie and rail-fastening, which is herewith illustrated and described. The invention comprises two devices, the tie and the fastening, each of which will be described separately.

In the accompanying cuts, Figs. 1 to 3, inclusive, refer to the railway-tie. The object of this device is to produce a metallic tie which shall possess the characteristics of cheapness, durability, strength, and elasticity; and it consists in a tie composed of a base-plate and a top-plate

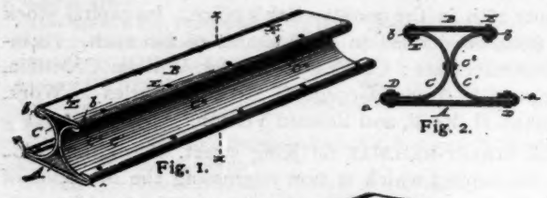


Fig. 1.

Fig. 2.

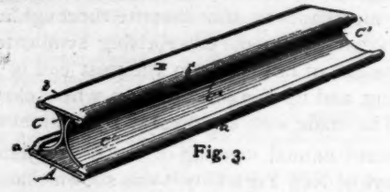


Fig. 3.

WHIPPLE'S RAILWAY-TIE AND RAIL-FASTENING.

of sheet metal united by intervening plates of curved form in cross-section. Fig. 1 represents a perspective view of the improved tie; Fig. 2 a vertical cross-section on the line *x x* in Fig. 1, and Fig. 3 a perspective view, showing a modified form of the tie.

The body of the tie consists of the base-plates A, the top-plate B, and the two body-plates C C'. The bottom plate is constructed in a flat form and of uniform width, and with its two edges curled upward and inward to form lips or flanges *a*. The top-plate B, which is usually of a width somewhat less than that of the base-plate, has its upper edges curled downward and inward, forming lips or flanges *b*. The body-plates C C', are each of a semi-circular form in cross-section. They are placed together, side by side, with their continuous surfaces bearing against each other, and are seated at their lower edges within the flanges of the base-plate, and at their upper edges within the flanges of the top-plate, as shown in the cuts. It is to be observed that when thus arranged the body-plates are seated and confined firmly against each other, so as to give mutual support and maintain the top-plate firmly in position. The flanges or lips may be compressed with more or less firmness upon the top plate, and, if desired, bolts or rivets may be placed through the edges to confine the parts firmly against movement upon each other, and to prevent them from being accidently disconnected. As shown in the cuts, the rivets C^2, unite the body-plates with each other, while the rivets D and E, unite the edges of the body-plates with the base and top-plates, respectively. The various plates may be made of such size and thickness and proportion as circumstances may require.

In order to provide for slight differences which may occur in the expansion of the several parts, and to prevent the straining or bending of the tie in consequence thereof, the holes through which the bolts or rivets are passed may be slightly elongated in the direction of the length of the tie. In place of using the rivets for this purpose, the top and bottom plates may be extended slightly beyond the body-plates and closed together over the ends of the same as shown in Fig. 3.

While it is preferred to have the body-plates of substantially a semi-circular form in cross-section, they may be made of angular or other form, provided they are adapted to support each other midway of their height.

It is claimed that this tie permits of any desired elasticity, the degree being produced by the variation in the thickness of the metal used, and by the method employed in making the ties, putting them together either closely or loosely. It is further claimed that the bottom-plates A, when buried in gravel or rock-ballast, secure a firm underground hold, thus giving the track solidity and strength.

In the acccompany cuts, Fig. 4 to 7, inclusive, refer to the fastening device, which consists of a plate provided with depending arms or ends to clasp the tie, and with lips upon the top to engage the edges of the rail-base. Fig. 4 is a perspective view showing the fastening device applied to the tie, the separable lip being detached; Fig. 5 a perspective view of the fastening as it appears when viewed from the opposite side; Fig. 6 a longitudinal vertical section of the tie and fastening with the latter in position, and Fig. 7 a top plan view of the blank from which the fastening is formed.

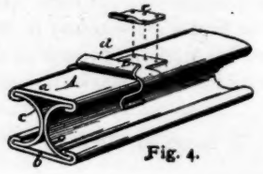


Fig. 4.

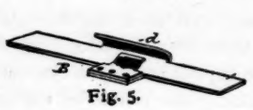


Fig. 5.

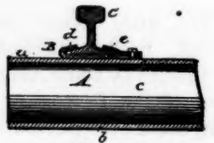
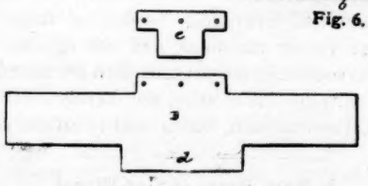


Fig. 6.



WHIPPLE'S RAILWAY-TIE AND RAIL-FASTENING

A represents the tie, B the fastening device, and C the rail. The tie consists of top and bottom plates *a* and *b*, having their edges curled inward to embrace the edges of intermediate supporting-plates *c*, which are made of concave form and arranged back to back. The fastening device is composed, as shown, of two parts. The main part consists of a plate, such as shown in Fig. 7, made of such length that when laid transversely upon the tie it will project beyond the same on both sides, the extended ends being adapted to be bent downward, so as to engage be-

neath the edges of the tie for the purpose of retaining the device thereon. On one side of the plate there is a projection *d*, which is curled inward and upward, as shown in Figs. 5 and 6, forming a lip to engage over one side or edge of the base of the rail. To secure the opposite edge of the rail, a removable plate *e*, is used, provided with holes to receive rivets, bolts, or other fastening devices by which it is united to the main plate. The inventor has modified the construction of this removable plate *e*, providing it with but two bolt-holes instead of three as shown in the cuts. The bolts come up through the top-plate *a*, of the tie, and are driven into snug-fitttng square holes. In order to remove the rail it is only necessary to remove one bolt and to move the plate *e*, back, when the rail can be at once removed and replaced by the same simple operation.

In making use of this device it is placed on top of the tie and beneath the rail, as shown in Fig. 5, and the ends hammered or otherwise bent into position to clasp the edges of the tie securely. This bending may take place either before or after the application of the device to the tie. After the rail is placed in position the plate *e*, is secured in place. The movement of the fastening lengthwise to the tie may be prevented by extending the fastening bolts or screws downward into holes in the top of the tie, or in any other manner answering the purpose.

As this fastening is constructed of wrought-iron or other ductile metal, its arms may be hammered into proper form to adapt them to the tie, and caused to clasp the latter with an elastic or yielding pressure. This insures a close fit of the parts, and prevents the noise and loosening of the parts which would otherwise result from the passage of trains.

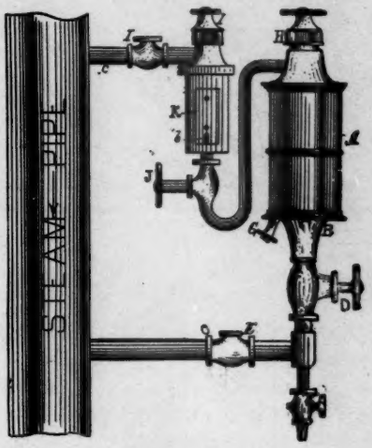
It is claimed by the inventor that with this form of tie and rail-fastening perfect gauge is obtained, since the fastenings are attached to the rails in the shop at the time of manufacture. It is further claimed that in track laying great economy of time and labor is effected in employing the above-described device.

Barclay's Lubricator.

PETER BARCLAY, of East Boston, Mass., is the inventor of a lubricator for all classes of machinery, which is herewith illustrated and described. The inventor has taken out several patents upon his device, and the description relates to it in its most recent form.

This invention provides a lubricator for locomotive, marine, and other steam-engines in which the oil is applied by the pressure of the steam, and is fed in a fine stream, or drop by drop, through a glass or glazed chamber, either directly when the feed is a downward-drop one, or indirectly through a fluid therein of different specific gravity when the feed is an up one. In this lubricator the steam is condensed in the lower portion of the oil-cup, or receptacle or chamber connected therewith, by an intercepting perforated device, and the oil expelled from the cup, through the pressure of the steam, by the rise of the water of condensation on which the body of oil in the cup floats. In its improved form, however, which is here described, instead of an intercepting perforated plate, a perforated coil is used whereby a greatly-increased condensing surface is obtained. When the lubricator is a downward-drop one, a perforated diaphragm is also arranged in or near the bottom of the glass tube or indicator, whereby the oil is restrained from being spattered or thrown back up the glass by the pulsations of the steam in the engine, and especially at starting the engine. The invention also includes a tubular bracket for carrying the lubricator and for conducting the oil to its place of discharge in the engine or pipe connected therewith, whereby the attachment of the cup is facilitated.

The accompanying cut shows the device in sectional outline, and also its application. A indicates the cup or oil receptacle of sectional construction as regards its body and bottom, and fitted internally with a lower horizontal tubular coil B, having numerous perforations throughout its length. This perforated coil B, is extended downward at its center through the bottom of the cup, where it is secured, and open below, while its other or outer end is



BARCLAY'S LUBRICATOR.

made solid or closed. This perforated coil, through which the steam from the steam-pipe circulates and is condensed in the lower portion of the cup, takes the place of the perforated plate before referred to, to give a diffused pressure on the oil, and, besides being generally superior thereto, will give a very much more extended condensing-surface than is attainable by a mere perforated plate, thus greatly adding to the efficiency of the lubricator. The steam is passed to the cup, below the coil, from any convenient place—as, for instance, from the boiler-dome, steam-pipe, valve-casing, etc.—up to and through the coupling C, and thence down through suitable connections provided with a valve D, for regulating the supply of steam to the cup, and with a check-valve E, to the coil B.

G is a cup-drain, and H a filling-cap to the cup; I a check-valve in the oil-discharge pipe from the cup, and J a hand regulating-valve for controlling the discharge of oil to the engine, or, rather, through a nozzle *b*, to the glass indicator-tube K.

This device is claimed to be simple in mechanism, durable, to work regularly by steam-pressure, and in any climate. It is now successfully employed on the *Etruria*, *Umbria*, *Aurania*, and a number of other fast ocean steamers.

Mershon's Valve-Oiler.

SAMUEL D. MERSHON, of Rahway, N. J., is the inventor of an improved valve-oiler, which is herewith illustrated and described. As constructed the oiler has its jointed discharge-rod connected with a crank-pin attached to a screw-wheel meshing into an endless screw, the shaft of which is provided with a pulley to receive a driving-band, whereby the oiler will be made to discharge oil with certainty at regular intervals of time.

In the accompanying cuts, Fig. 1 is a front elevation of the oiler, part being broken away; Fig. 2 a scctional side elevation of the same, taken through the line *y y* in Fig. 1, and Fig. 3 a sectional plan view of the tube and the discharge-rod, taken through the broken line *x x x x* in Fig. 2.

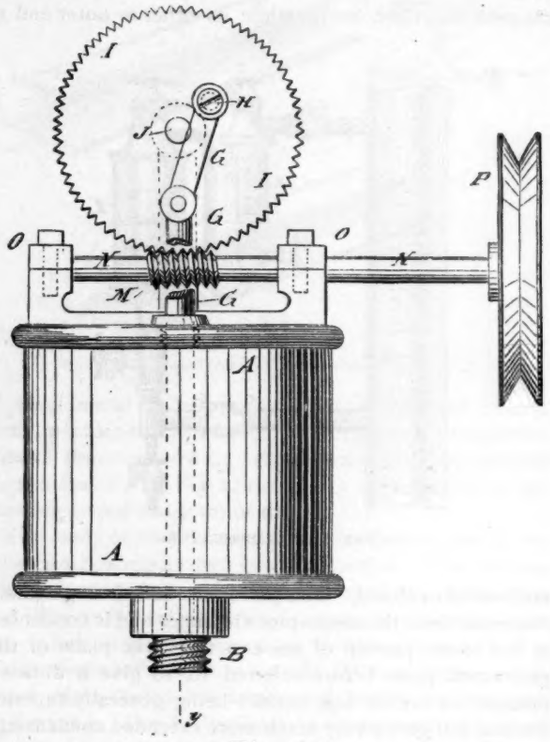


Fig. 1.

MERSHON'S VALVE-OILER.

A represents the oil reservoir or cup, through the center of which passes a tube B. The tube B, may be formed solid with the top of the reservoir A, and screwed into a screw-hole in the bottom of the reservoir, or secured in place in any other suitable manner. Oil is introduced into the reservoir A, through an opening in its top, which opening is closed by a screw-plug C, having a perforation D, formed through it to admit air to the reservoir to take the place of the oil as it is discharged.

In one side of the tube B, is formed an opening E, through which oil can pass into the interior of the tube and enter the recess or pocket F, formed in the side of the rod G, and fitted accurately into the tube. The pocket F, is formed in such a position as to come opposite the opening E, when the rod G, is raised, and thus become filled with oil. As the rod G, moves downward, the oil in the recess F, is carried with it and flows out through the lower part of the tube B, to the surface to be oiled. The bore of the lower part of the tube B, is enlarged or made eccentric from its lower end to the point opposite the recess F, when the rod G, is at the lower end of its stroke, as shown in Fig. 2, so that the oil can flow out of the recess F, freely. The upper part of the rod G, is jointed, and its upper end is pivoted to a crank-pin H, attached to the screw-wheel I, the journal J, of

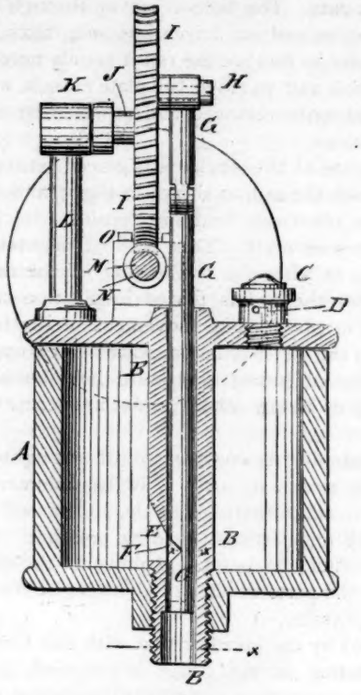


Fig. 2.

MERSHON'S VALVE-OILER.

which revolves in a bearing K, attached to or formed in the upper end of the standard L, attached at its lower end to the top of the reservoir A, so that the rod G, will be moved down and up at each revolution of the screw-wheel I, and will thus discharge the contents of the recess F, to the surface to be oiled at each of the revolutions. The teeth of the screw-wheel I, mesh into the threads of an

Fig. 3.

MERSHON'S VALVE-OILER.

endless screw M, formed upon or attached to the shaft N, which revolves in bearings O, attached to the top of the reservoir A. To one end of the shaft N, of the endless screw M, is attached a pulley P, to receive a band passing around the shaft of the engine or some other convenient revolving part of the machinery. The amount of time

between the successive discharges of oil can be regulated by increasing or diminishing the number of teeth in the screw-wheel I, or by using a smaller or larger pulley P.

It is claimed for this device that it is simple, efficient and economical, a saving of fifty per cent. of oil being effected; that it gives a positive and regular feed, and is readily attached and requires no attention other than filling; that the flow of oil increases and diminishes with the speed of the machinery, and that the device is durable and not liable to derangement.

The inventor also has a former patent upon the oiler, in this case it being arranged with a ratchet-wheel operated by a pendulum that is kept in motion by the reciprocating motion of an engine or similar machine.

Fischer's Car-Axle Box.

JOSEPH FISCHER, of Elizabeth, N. J., is the inventor of an improved self-feeding journal-box for car-axles, which is herewith illustrated and described. The object of the invention is to provide a journal-box so constructed that it continually feeds oil upon the journal, and it consists in the combination, with a journal-box, of a shaft in the same, two rotary pumps on the ends of the shaft, and a pulley between the pumps, which pulley is revolved by the axle, thus operating the pumps, which deliver the oil upon the journal.

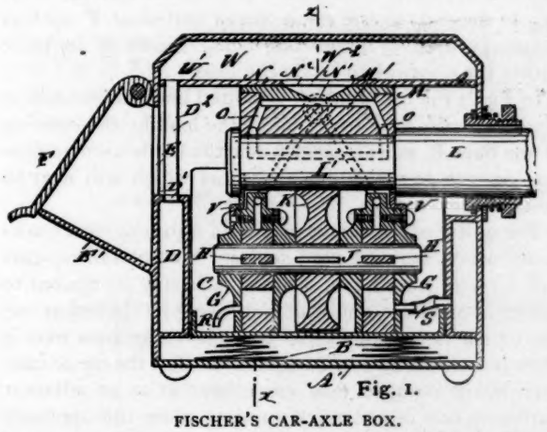


Fig. 1.

FISCHER'S CAR-AXLE BOX.

In the accompanying cuts, Fig. 1 is a longitudinal sectional elevation of the journal-box, and Fig. 2 a cross-sectional elevation of the same on the line *x x* in Fig. 1.

The journal-box A, is provided with the removable bottom A', upon which springs B, rest, which carry a smaller box C, fitting quite snugly within an oil-chamber D, formed on the inside of the journal-box. The journal-box A, has an opening E, at which a cup E', projects from the end of the box, which cup can be closed by a hinged door F. An oil-chamber W, is formed in the upper part of the box A, by a partition W', having an aperture W^2. A pipe D^2, conducts the oil down into an oil-chamber D, which has an opening D', in its top at any suitable place for securing the lower end of the tube D^2. In the case shown the opening D', is at the opening E.

On the bottom of the box C, two rotary pump-frames or casings G, are placed, the piston-plates H, of which are mounted to work in the ends of a shaft, J, journaled in the casings and carrying a pulley K, between them, which pulley is in contact with the journal L', of the axle. On the journal L', a block M, rests, which has a cavity M', in its top, in which a plate N, is placed, having a central aperture N', and a cavity N^2, in its top, which cavity decreases in diameter towards the bottom. The block M, has channels O, for conducting the oil, etc., from the cavity M', to the journal L', and a channel P, for con-

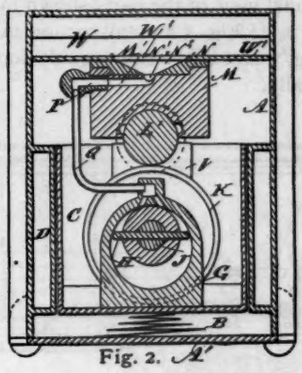


Fig. 2.

FISCHER'S CAR-AXLE BOX.

ducting the oil into the cavity M'. The oil can pass from the cavity N^2, through the aperture W^2, in the chamber W.

The oil is conducted from the pumps G, into the channel P, by two pipes Q, united at their upper ends. One pump is provided with a tube R, for drawing oil from the bottom of the box C, and the other is connected by a flexible pipe S, with the oil-chamber D. On the pump-frames two pieces V, are held to project upward, and have semi-circular recesses in their top edges for receiving the journal L'. When the axle swings more or less in the horizontal, the entire pump mechanism swings with it on the bottom of the box C, and the above-mentioned pieces V, are provided to hold the axle in such a manner that it will cause the pumps to swing with it.

The operation of the device is as follows: The pulley is revolved from the journal L', and as the pump-pistons are on the same shaft with the pulle they are revolved also, and thus the pumps are operated as long as the axle revolves. One pump pumps the oil from the tank or oil-chamber D, through a pipe Q, into the cavity in the top of the block M, and from this cavity the oil flows upon the journal, and the excess of oil which is not taken up by the journal passes out through the channels in the block M, through the openings N' and W^2, into the chamber W, and through the pipe D^2, into the chamber D, from which it is pumped again. The oil that drops from the journal is collected in the bottom of the box C, and is pumped up through the pipe R.

The inventor claims this device to be simple, durable and efficient.

Wolcott's Dumping-Car and Car-Dump.

ANSON WOLCOTT, of Wolcott, Ind., is the inventor of an improved railway dumping-car, with dumping mechanism, the construction and operation of which are shown in the accompanying cuts and description. The invention is designed to furnish a means for unloading grain, coal, ores and other freight, from platform, gondola, or box-

cars. and it is covered by two patents, one for the car and the other for the dumping mechanism. Figs. 1 to 6, of the cuts, inclusive, refer to the car, and Figs. 7 to 13, inclusive, to the car-dump.

Fig. 1 is a side elevation of a closed or box-car embodying the improvements; Fig. 2, a transverse section of the same, taken upon line *x x* in Fig. 1; Fig. 3 a fragmentary side view of a flat car, showing one end thereof. Fig, 4 a detail sectional view of the parts shown in Fig. 3, taken upon the line *x x*; Fig. 5 a detail section taken upon the line *y y* in Fig. 3, and Fig. 6 shows a side door constructed to slide vertically.

A means for sustaining the hinged side of a flat car is shown in Figs. 3 and 4. In this case the hinged sides or flaps B, are pivotally connected at their upper ends with posts or standards E, fixed in the car-platform adjacent to the inner faces of the flaps. The sides or flaps B, are in this case constructed with vertical bars *b'*, in the same manner as before described, and the posts E, are provided upon their upper ends with castings *e*, provided with lugs or ears, affording bearings for the pivots of the hinges *b*, of the flaps. The means for locking the flaps shown in the cuts are similar to those before described. The box-car shown is provided with the usnal central doorway at

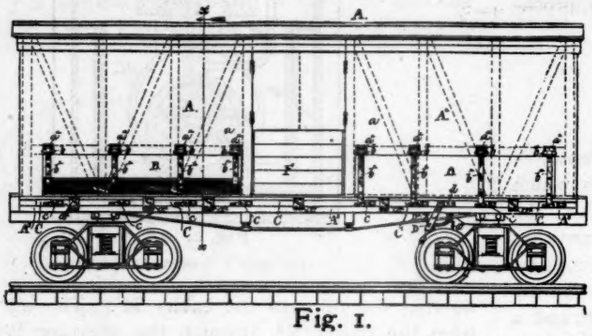


Fig. 1.

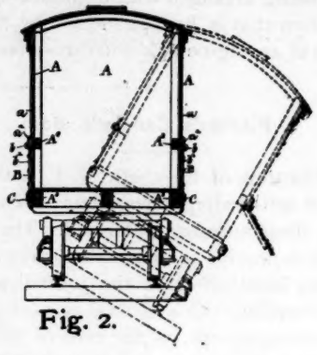


Fig. 2.

WOLCOTT'S DUMPING-CAR AND CAR-DUMP.

A is the car body of any usual or preferred construction, and B B are hinged wall-sections or flaps, which are connected at their upper margins by hinged or pivotal connections *b*, with the car-frame or suitable supports thereon, and are adapted to open upward to permit the free discharge of the contents of the car. In Fig. 1 a box-car is shown, having its stationary side walls, A', extended to within a foot and a half or two feet of the floor thereof, and provided with wall-sections B B, hinged at

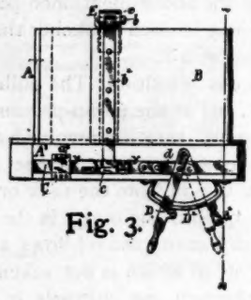


Fig. 3.

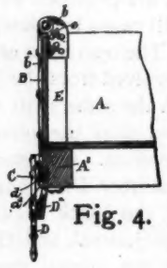


Fig. 4.

Fig. 5.

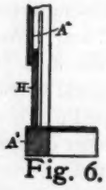


Fig. 6.

WOLCOTT'S DUMPING-CAR AND CAR-DUMP.

their upper edges to the stationary walls, and arranged to close the longitudinal opening or passage between the lower margins of the stationary walls A' A', and the car-floor. The hinged parts B B, in the case of a box-car, may embrace the entire thickness of the car-wall, or may include the outer sheathing or planking only. The latter construction is shown in the cut.

the middle of each of its sides, and its flaps B, are constructed to extend from points at either side of the doorway to the ends of the car, a low or half door F, such as is usually used in grain-cars, being shown as in place within the doorway to retain the load.

In Fig. 2 the car is shown in dotted lines as inclined or tilted sidewise, so as to discharge the load by the opening of the flaps B, as will occur when the car is used in connection with the dumping apparatus which will next be described.

The object of this latter invention is to provide a track-dump which may be used for any kind of railway-cars and for any number of such cars it may be desired to handle at one time, and which also may be applied at any point in a railway-track, so that cars may pass over it when it is not used as a dump, and so that the car or cars, after being dumped, may move over it to an adjacent stationary part of the track so as to allow the approach to the dump of other cars on the same track, It consists of a part or section of track pivoted to rotate upon a longitudinal axis, so that it may be tipped laterally or sidewise together with the car or cars resting thereon, whereby the load may be discharged by gravity from the cars, This particular feature of the invention may be carried out in a number of ways which will readily suggest themselves to a practical mechanic. In the particular form of device as here shown, as one way of carrying it into practice a section of the track-rails, of suitable length, is carried upon a rigid frame formed by suitable longitudinal and cross girders, this frame being provided with trunnions or journals mounted in bearings upon the adjacent ends of the stationary track structure, the frame being suitably placed to permit the load to be discharged from the cars upon the dump into wagons, other cars, vessels, bins, or other receptacles, or upon the ground.

Figs. 7 to 13, inclusive, show the operation of the device. Fig. 7 is a side elevation, partly in central longitudinal

section, of one form of a track-dump; Fig. 8 a transverse section of the same, taken upon the line *x x* in Fig. 7; Fig. 9 a side elevation of another form of the track-dump; Fig. 10 a transverse vertical section of the same, showing the end of the pivoted frame or platform, taken upon the line *x x* in Fig. 9; Fig. 11 a transverse section through the stationary part of the track-supporting structure, looking toward the dump, taken upon the line *y y* in Fig. 9; Fig. 12 a detail transverse section through the dump-frame or platform, taken upon the line *z z* in Fig. 9, and Fig. 13 a transverse detail section, taken upon the line *x' x'* in Fig. 9, illustrating the construction of a bearing or support at the middle of a long dump-frame.

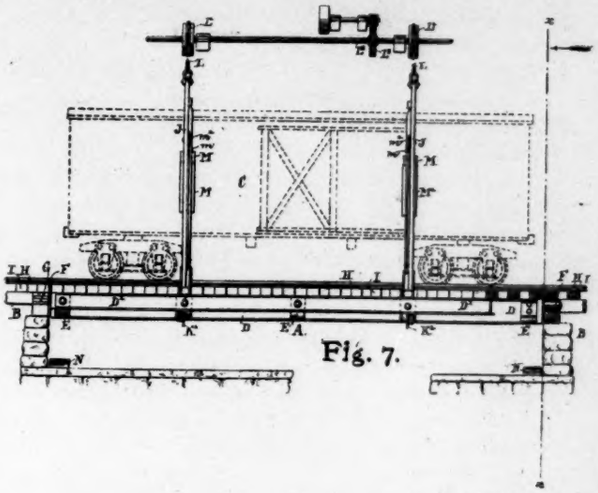


Fig. 7.

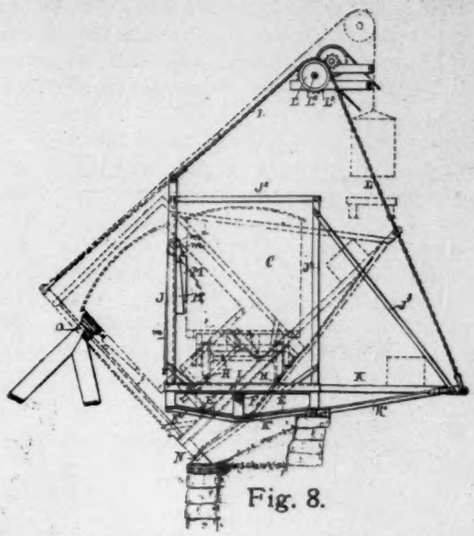


Fig. 8.

WOLCOTT'S DUMPING-CAR AND CAR-DUMP.

A is the dump-frame as a whole. B are portions of the track structure adjacent thereto, and C is a railway-car shown as resting upon the frame. The form of the device illustrated in Figs, 7 and 8 is more particularly adapted for box-cars, such as are used in carrying grain, the intention being in this case to tip or tilt the car at such an angle that the grain, or the greater part thereof, will be discharged through its door. The main part of the frame or platform is, as shown in the cuts, formed of a central longitudinal beam or girder D, longitudinal side girders D', and cross-pieces or brackets E, connecting the middle with the side-girders, the frame thus formed being pivotally supported at its ends by journals or trunnions F, held in suitable bearings G, sustained upon suitable cross-timbers of the stationary track structure B. The track-rails H, are shown as supported upon cross-ties I, placed upon the longitudinal girders in the usual manner. The form of the dump shown in this cut is intended to tilt in one direction only, to prevent possibility of the dump-frame being accidentally tilted, and to avoid the necessity for the use of locking devices to hold the frame horizontal, The longitudinal girder D, and the trunnions F, are located in a vertical plane at one side of the center of gravity of the frame and cars thereon, so that the frame, unless forcibly moved, will remain in its horizontal position.

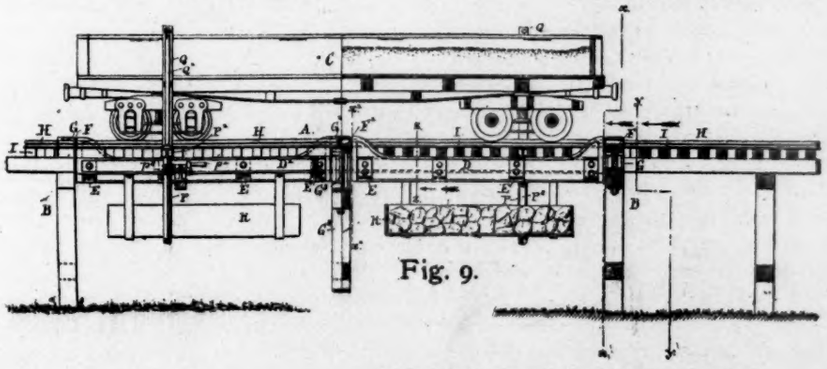


Fig. 9.

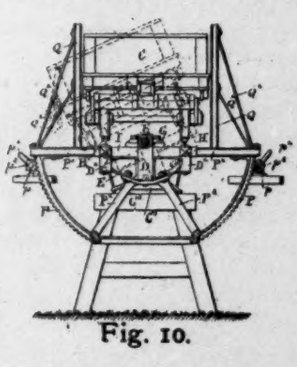


Fig. 10.

WOLCOTT'S DUMPING-CAR AND CAR-DUMP.

Any suitable or well-known device may be applied to the dump-frame A, for the purpose of tipping or tilting it, a preferred device for this purpose being shown in Figs. 7 and 8, in which the frame is provided with one or more vertical and horizontal arms J K, rigidly attached to the frame, and to the outer ends of which are connected suitable ropes or chains adapted to pass over drums or pulleys, which are suitably driven so as to tilt the frame, the arms J and K, preferably being made of considerable length in order to enable the movement of the arm to be controlled by the application of a relatively small amount of power to the chains. As shown in Figs. 7 and 8 the outer ends of the arms J and K, are located at equal distances from the center of rotation of the frame, and a

chain L, is connected at its ends with both of these arms and passes at its middle over a sprocket-gear L′, which is rotated by suitable actuating devices in either direction in tilting the frame.

In the operation of this device, the outer ends of the arms J and K, are moved to the same extent when the frame is tilted, so that the chain L, will always remain taut over the pulleys L′. The pulleys L′, may be supported in any suitable manner, and driven by hand or power, the pulleys, as shown in the cuts, being secured to a shaft L^2, provided with a gear-wheel L^3, to which power may be applied from an engine or other source for moving the dump-frame.

In order to prevent the car from tipping over or becoming derailed when the dump-frame is inclined at a considerable angle, supporting devices are provided upon the dump-frame, against which the side of the car may rest when the frame is inclined. One form of such support is illustrated in Figs. 7 and 8, in which the vertical arms or beams J, are located opposite the sides of the car, and suitable means are provided between the arm and the car for sustaining the latter from the former.

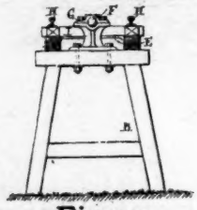


Fig. 11.

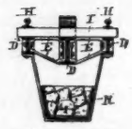


Fig. 12.

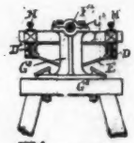


Fig. 13.

WOLCOTT'S DUMPING-CAR AND CAR-DUMP.

The dump-frame shown in Figs. 9 to 13 is constructed with longitudinal girders D and D′, and brackets E, and is provided at its ends with the trunnions F, having bearings G, upon the stationary part of the frame, in the same manner as before described. In this case, however, the pivotal axis is centrally located, so that the frame is adapted to tilt in either direction, and the trunnions are shown as located at a point near the level of the rails, and as high as possible without interfering with the parts of the car-trucks, the object of this construction being to bring the axis of rotation as near as possible to the center of gravity of the car and frame, so that the parts will be more nearly balanced, and may be more easily moved when tilted.

A lever or any other suitable means connected with the frame may be used for moving the latter. A simple and convenient device for this purpose is shown in Figs. 9 and 10, consisting of two segmental gears P, located at either side of the frame and connected with the latter by horizontal beams P′ and arms P^2, the segmental gears being engaged with pinions p^2, upon a shaft p, mounted upon suitable stationary frames at both sides of the dump, so that the latter may be operated at either side of the track. The shafts p, may be actuated by power, or they may, as shown, be provided with cranks p', for moving the frame by hand. The beams P′, afford a convenient means of attachment for posts or supports Q, for sustaining the car upon the dump when the latter is tilted. These posts are, as shown, located close to the sides of the car, and are attached at their lower ends to the beams P′, and made rigid by inclined braces Q′, having a footing upon the outer ends of the beams P′.

A dump-frame constructed as above described may be made without a central support—as, for instance, when used for single and short cars—or it may be provided with one or more intermediate supports, as would be necessary in case the frame were designed to hold at once two or more cars. In the form of the device shown in Fig. 9, the beam D, is provided in the middle of its length with a journal F′, which has a bearing G′, supported upon a suitable frame G^2. It is of course desirable that the entire frame should be perfectly rigid, and for this purpose, in the construction here shown, the girders D′, are made continuous from end to end of the frane past the point at which the central girder D, is interrupted or reduced in size to form a journal, as F′, at the intermediate point of support of the frame.

In order to balance more perfectly the car and dump-frame upon the pivots or journals of the latter, so that a minimum of power need be used for actuating the dump, a counter-balance weight or weights may be applied in any suitable manner for this purpose. A simple and convenient form of such weight is shown in Figs. 9 and 10, in which boxes or receptacles R, adapted to receive stone or other material, are supported beneath the dump-frame. A similar result may be obtained in the construction shown in Figs. 7 and 8, by locating similar receptacles beneath the dump-frame, or by placing a receptacle containing stone or a weight or weights of other kinds upon the horizontal arm K, as indicated by dotted lines in Fig. 8.

In order to relieve from the posts or arms J or Q, which support the car from lateral movement, a part of the strain to which they would otherwise be subjected, ropes or chains attached to the upper ends of the posts and extending over suitably-located pulleys, may have weights attached to them which will act in opposition to the weight of the car and tend to sustain the frame and return it, when tilted, to its normal position, This construction is illustrated in dotted lines in Fig. 8, in which a platform or support is shown as located beneath the weight in position to receive it when the frame is nearly horizontal, so that the weight will act only when the car is tilted at a considerable angle. A weight such as is above referred to and shown in dotted lines in Fig. 8, may obviously be alone used as a counter-balance, instead of the counter-balance-weights above mentioned in combination with any one of such devices.

By the use of this dumping apparatus one or more cars, as may be desired, can be dumped at the same time by an extended dump track, which may be coupled out to any desired length.

Davis' Electro-Magnet for Signals.

WILLIAM E. DAVIS, of Jersey City, N. J., is the inventor of an electro-magnet for signals, which is herewith illustrated and described. The invention, which may be applied in railway and other uses, consists in combining an electro-magnet with projecting pole-pieces of peculiar form, above which the armature, having a convex lower surface, is adapted to rotate or oscillate. By means of this improved instrument the armature which carries the signal will be turned into one position whenever the circuit is closed, and automatically turned back by a suitable spring into another position whenever the circuit is open,

provided one single electric-magnet is used, while if two magnets are used the position of the signal will depend entirely upon the current that passes through either one of the electro-magnets.

In the accompanying cuts, Fig. 1 is a side elevation of the electro-magnet; Fig. 2 a front view of the same; Fig. 3 a top view; Fig. 4 a side view of a modification of the same, and Fig. 5 a top view of the modification.

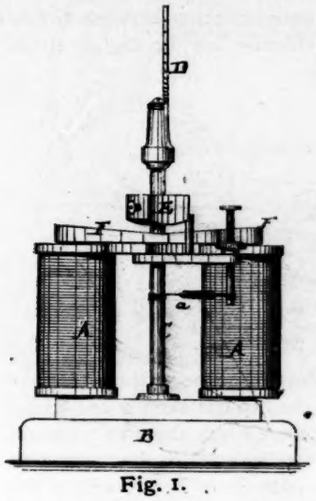


Fig. 1.

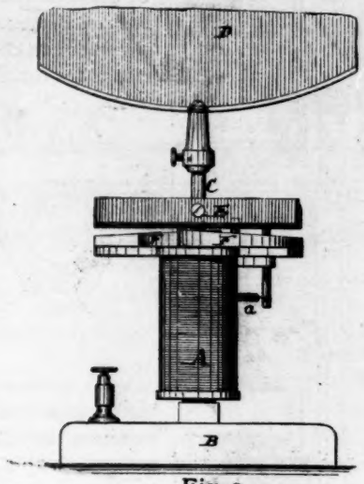


Fig. 2.

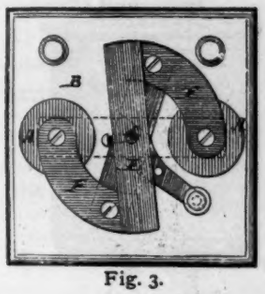


Fig. 3.

DAVIS' ELECTRO-MAGNET FOR SIGNALS.

In the device as shown in Figs. 1, 2 and 3, A represents an electro-magnet fixed upon a suitable stand B, in which stand an upright shaft C, carrying a signal D, is swiveled. This upright shaft carries the armature E, which is a bar having a convex lower face and adapted to extend over the

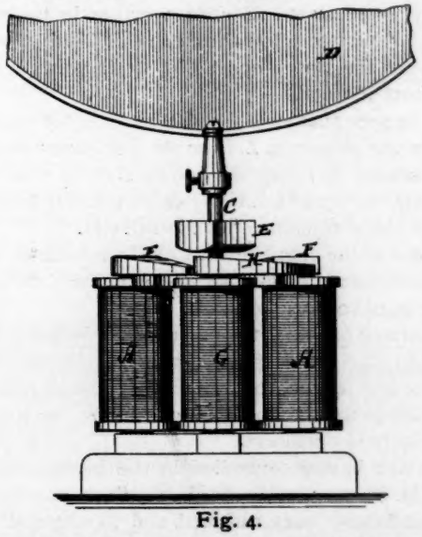


Fig. 4.

DAVIS' ELECTRO-MAGNET FOR SIGNALS.

centers of the two spools of the electro-magnet A, as shown by dotted lines in Fig. 3. To each of the spools of this electro-magnet, at the pole ends thereof, is secured a projecting bar F, of iron or analogous material, which bar has an inclined upper face, so that it is highest near the spool and lowest where farthest away from its spool. A small spring *a*, draws the shaft C, so as normally to hold the armature E, in the position in which it is represented by full lines in Fig. 3, with its ends above those parts of the projecting bars F F, which are farthest away from their respective spools.

When a current is passed through the electro-magnet A, the arms F F, will both be magnetized, and will draw the armature E, toward the spools. The inclined upper faces of the bars F F, coöperating with the convex lower side of the armature E, serve to draw the armature gradually into alignment with the spools, into the position shown by the dotted lines in Fig. 3. As long as the current lasts the armature will remain in this position above the spools. The moment the current is interrupted, the spring *a*, will exert its influence, and will draw the armature F, back into the full-line position which is shown in Fig. 3. The shaft C, may carry a signal D, which, when the current is established, will indicate "danger," and when it is interrupted it will indicate "safety."

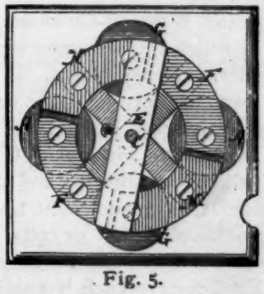


Fig. 5.

DAVIS' ELECTRO-MAGNET FOR SIGNALS.

When the parts are in the position shown by full lines in Fig. 3, the distance vertically between the armature and the arms F, will be greater than when in the position shown by dotted lines line in that figure. The power of the magnet upon the armature is increased as the armature approaches the cores of the electro-magnets.

In Figs, 4 and 5 the invention is represented as duplicated, showing two electro-magnets A and G, of the same kind as the electro-magnet A, which is shown in Fig. 3. The electro-magnet A, of the modification, has the projecting-arms F F, which extend toward the electro-magnet G, and the electro-magnet G, has similar arms H H, which extend to the electro-magnet A.

Bold's Lubricator.

FRED. BOLD, of St. Louis, Mo., is the inventor of a lubricator, which is herewith illustrated and described. The device belongs to that class of lubricators in which the water resulting from the condensation of the steam within the lubricator causes the overflow of oil into a discharge tube.

Fig. 1.

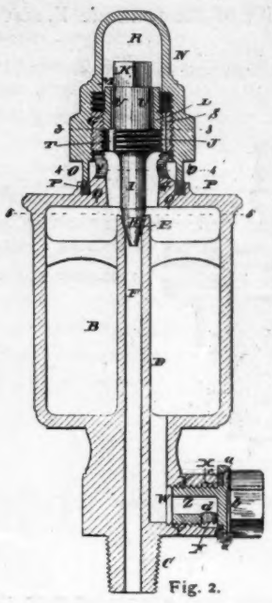


Fig. 2.

BOLD'S LUBRICATOR.

In the accompanying cuts, Fig. 1 is a side view of the lubricator with part of the screw-cap broken away; Fig. 2 a vertical section at 2 2 in Fig. 1; Fig. 3 a transverse section at 3 3 in Fig. 2; Fig. 4 a transverse section at 4 4 in Fig. 2, and Fig. 5 a transverse section at 5 5 in Fig. 2 with the valve removed.

A is the oil-cup, and B the oil-chamber. C is a screw-threaded nipple, by which the lubricator is secured to the steam-chest, cylinder, or other object. D is a tube extending upward from the bottom of the cup, and having at the top a conical valve-seat E, the bore F, of the tube extending down through the nipple C. G is the tubular neck of the cup, which has interior and exterior screw-threads. The valve H, is formed to fit the seat E. Its stem I, has a screw-threaded part or collar J, working in the female screw of the neck, and an angular top K, to which an adjusting key or wrench is applied to raise or lower the valve. L is a jam-nut, which also works in the female screw of the neck G, and which serves to hold the valve to its adjustment, the bottom of the nut bearing upon the top of the collar J. M is the angular part of the jam-nut, to which the wrench or key is applied to turn it. N is the screw-cap, which turns on the male screw of the neck G, and which has at bottom an annular rim or flange O, bearing, when the cap is screwed down, upon the soft-metal seat P, which is cast in an annular dove-tailed recess Q, made in the top of the oil-cup. It is preferable to form the recess or groove Q, wide enough to allow the annular rim or flange O, to enter the recess as the soft metal wears away.

At the upper end of the screw-cap N, is a steam-condensing chamber R, into which the steam is allowed to enter from the oil-chamber B, and from which the water of condensation returns to the chamber and raises the surface of the oil and causes it to overflow the upper end of the tube D. As a means for this passage of steam and water, a vertical groove S, is shown, cut in the inner side of the neck G, and a passage T, extending through the collar J, and communicating with an annular passage at U, between the jam-nut and the valve-stem. Either or both of these means of communication between the oil-chamber and condensing-chamber may be used, or similar means for these purposes.

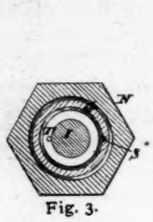


Fig. 3.

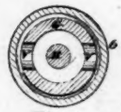


Fig. 4.

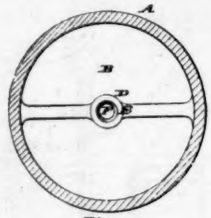


Fig. 5.

BOLD'S LUBRICATOR.

V are orifices in the sides of the neck, through which the oil is poured in when the cap has been raised a small distance, the filling being done when there is no steam-pressure within the oil-chamber. W is the waste-pipe, having at the mouth a counter-bore X, and within that a female screw Y, in which works the tubular stem Z, of the plug, by which the mouth of the drain-passage is closed. The face of the flange *b*, of the plug is formed with an annulus *a*, of soft-metal run into a dove-tail annular groove of the flange-head *b*. The annular plug-seat *c*, is preferably made so thin as to enter the dove-tail groove containing the soft-metal facing as the metal of the facing wears away. *d* is an aperture in the side of the tubular stem to allow the escape of liquid from the oil-cup when the plug is opened by turning out the valve-stem a short distance.

It will be seen that as in discharging it is not necessary to remove the plug-stem Z, from the discharge-mouth, so it is not needed in filling the oil-chamber to remove the cap N, from the neck G, it being only necessary to remove the cap to allow adjustment of the valve H.

As shown in the cuts, the body of the lubricator is cast in one piece, but the inventor does not limit the device to this form of construction.

It is claimed for this lubricator that it is simple, inexpensive and efficient, that there are no wooden handles to work loose and fall off, that there are no small glands to pack, no joints to leak, and that once filling the feed it is kept regularly in operation,

The device is now controlled by the inventor and by William M. Stanton, of St. Louis, to whom one-half the patent-rights have been assigned, and to whom all communications should be addressed.

Gidley's Endless-Chain Railway Curve.

ROBERT GIDLEY, of Washington, N. Y., is the inventor of an improvement in the construction of endless-chain railways, which is herewith illustrated and described. The chief object of the invention is to provide, in con-

nection with means for driving the cable, a cheap and simple means for conveying the cable around curves in the line of track.

In the accompanying cuts, Fig. 1 is a plan view showing the cable with both the idle and drive-pulleys attached, the covering being partly broken away; Fig. 2 an inverted plan view of the same; Fig. 3 a view of a side elevation, partly broken away to show the operating mechanism, and Fig. 4 a cross-sectional view.

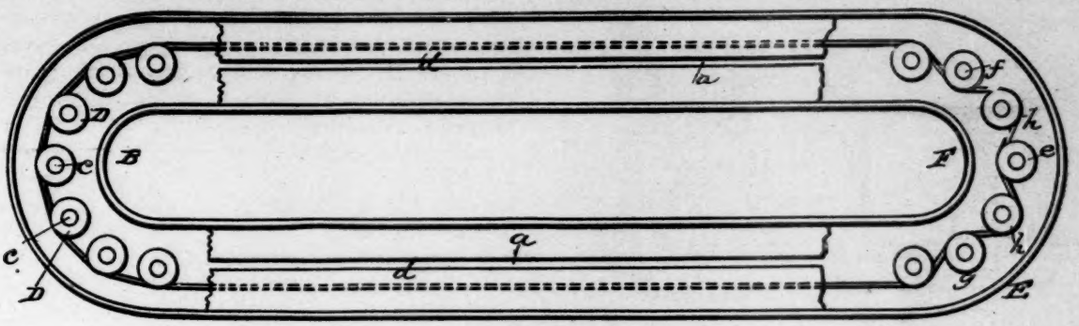


Fig. 1.

GIDLEY'S ENDLESS-CHAIN RAILWAY CURVE.

A is the frame or bed for supporting the track, which may be of any approved construction, and arranged above or under ground, and at a sufficient height for the introduction of the operating mechanism, and *a* is a slot for the passage of the grip to the cable; but instead of this slot there may be a space the entire width of the track, to permit of the cable being gripped by the clutch.

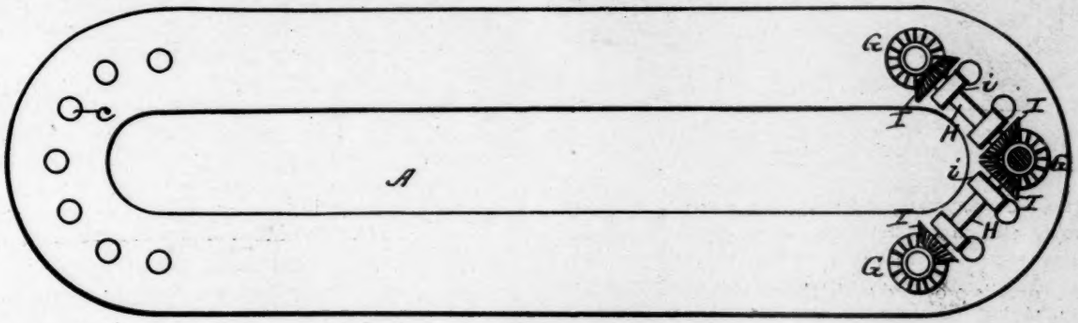


Fig. 2.

GIDLEY'S ENDLESS-CHAIN RAILWAY CURVE.

At one end of the track or curved portion—such as B—is arranged a circular series of vertical shafts *c*, which are respectively provided with an idle-pulley D, grooved, as shown, to receive and support the cable *d*. The opposite end or curved portion E, of the track is provided with the drive-pulleys, there being one arranged about midway of the curve F—such as *e*—and one at each side thereof—such as *f g*—the whole being arranged somewhat at a triangle with relation to each other. Arranged in a semi-circle alternately with the drive-pulleys *e f g*, are idle-pulleys *h*, of a construction similar to those at the opposite curved portion of the track, for supporting the cable.

The drive-pulley shafts are respectively provided with a horizontal fixed bevel gear-wheel G, and are connected together by means of the short horizontal shafts H, and miter-gears I, the shafts being supported in suitable bearings *i*, to the frame or bed. One of the drive-pulley shafts may be of greater length than the other two, and provided at its lower end with a fixed band-wheel or bevel gear L, by which motion may be received from any suitable mechanical motive-power and imparted to the connecting-pulleys and the cable.

It is claimed by the inventor that by the use of this construction the cable may be conveyed around curves in a simple and satisfactory manner.

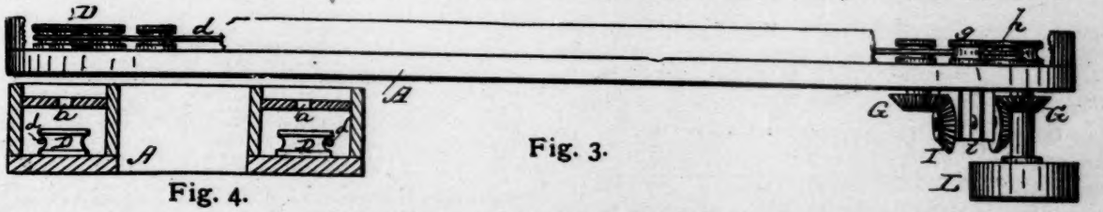


Fig. 3.

Fig. 4.

GIDLEY'S ENDLESS-CHAIN RAILWAY CURVE.

Hascy's Rail-Joint.

ALONZO HASCY, of Brooklyn, N. Y., is the inventor of a rail-joint which is herewith illustrated and described. It is designed to furnish a joint for railway rails that will prevent the lamination of the rails at their ends and also the jarring and noise created by the passage of the car-wheels over the joints.

In the accompanying cuts, Fig. 1 is a plan view of two rails joined by the device; Fig. 2 an end view of a rail prepared for the application of the device, and Fig. 3 a view of the dowel-bolt used in effecting the joint.

The dowel-bolt A, is cylindrical in form, and provided with a web *a*, this web having straight sides and circular

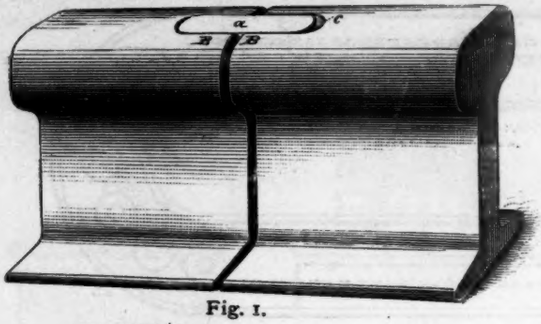


Fig. 1.

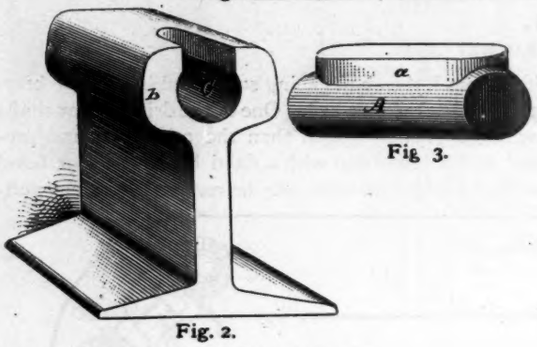


Fig. 3.

Fig. 2.

HASCY'S RAIL-JOINT.

ends, as shown in Figs. 1 and 3. B B are adjacent ends of two rails, each of which is provided with a recess C, adapted to conform to the curvature of the dowel-bolt A, and web *a*, as shown in Fig. 2. It will thus be seen that when two rails provided with these recesses C, are laid with their ends slightly apart to make provision for expansion, as shown in Fig. 1, and the dowel-bolt is inserted in the recesses, a firm joint is made, and a bridge is provided between the rail ends over which the car-wheels may run without crushing or injuring the rails in any manner, and without the concussion and rattling common to the passage of car-wheels over the joints of rails.

It is claimed that this device is simple, that the dowel-bolt is effective in its operation, and that no screws or bolts are required to hold it in position. The device is also applicable to street-railway rails.

RIEHLÉ BROTHERS, proprietors of the Philadelphia Scale and Testing Machine Works, have recently received the following orders: Two testing machines, from Lawrence Scientific School, Harvard University; one testing machine, from the University of Wisconsin; one testing machine, from the American Screw Company, Providence, R. I.; one cloth tester, from Messrs. Wm. Ayers & Sons, Philadelphia; one marble molding machine, from A. Klaber & Co., New-York; one marble molding machine, from Messrs. Buess & Co., New York; one marble molding machine, from H. C. & G. S. Bailer, New-York; one charging scale, to Robert. H. Coleman, Cornwall, Pa.; one charging scale, to Fisher, Ferguson & Co., Colebrook, Pa.; two special pig metal scales, for Glendon Iron Company, designed by Mr. Frank Firmstone, superintendent; also large scales to Repanno Chemical Company; Wilson & Fennimore, Bristol; Maiden Creek Iron Company; Mont Alto Iron Company; Huff, Fontaine & Abbott. In addition to the above, their orders for portable platform and counter scales, trucks and other specialties, have been brisk, and they are now busier than they have been for months. They regard these orders, coming from so many branches of trade, as an index of approaching prosperity.

ATTENTION is directed to an advertisement in this issue calling for the construction of a railway in Astoria, Oregon. Liberal inducements are offered.

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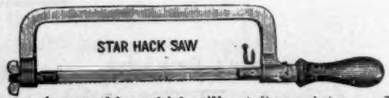

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MANSFIELD, OHIO, *November 3d, 1884.*

To the Westinghouse Air Brake Company, Pittsburgh, Pa.:

GENTLEMEN:—Understanding from your published announcements that you recommend your brake for freight-train use we respectfully invite you to a complete and searching public test of its merits in competition with the *Rote Automatic Brake.* This test to be made in so complete and critical a manner as to show all the railroads of the country, as well as the Railroad Commissioners of the various States, which of the two brakes is the one which should be used; for the test will, we are certain, leave no doubt in the minds of any witnessing it.

To insure the proper management of the test we suggest that you choose one person, we another, and these two a third person, all three to be well known as capable and honorable rolling-stock experts, to conduct the test, their expenses to be jointly borne by you and by us.

An invitation to witness the test to be extended to the General Officers of Railroads and all State Railroad Commissioners, to the members of the National Car-Builders Association, and to the Railroad and daily press.

The test to be at such time and place as may be mutually agreed upon, but we suggest that the proper place would be on some road having high grades and sharp curves, so that both brakes may have as hard and complete a test as possible. As it is necessary to make the test searching and complete, and as all railroads wish to increase the length of their trains and only wait for a brake which will enable them to do so, we think each train should be made up of 50, 60 or 70 cars, as you may prefer or, if you think best, of even more cars.

Your company to supply your train and engines, we to supply ours.

The following points, among others, to be considered and reported upon:

Cost of equipping trains.

Simplicity.

Freedom from breakage.

Certainty of action.

Effectiveness.

Cost of maintaining.

"Flatting" of wheels.

Any other points submitted by you or by us in writing to be added to the above.

The brakes or trains are to be tested in every manner and under all conditions which practical railway service may suggest, including yard as well as line service.

Among others the following tests are to be applied to both trains:

1st.—Each train is to be (part of the time) run by engineers and crews who have never operated either brake and who are wholly unfamiliar with them.

2d.—The trains are (part of the time) to be partly made up (as nearly all freights are everywhere) of foreign cars, which have neither your nor our brake on, so that the cars having your break or ours on shall be widely and irregularly separated from each other.

3d.—The locomotives drawing your train and ours to be exchanged, from time to time, and draw each others trains.

4th.—Two locomotives equipped as so many freight engines and tenders are, with hand-brakes instead of steam or air brakes, are to be substituted for the two engines used in the test part of the time. Any brake which will not work properly if this is done, you will admit, can be of little practical value in actual service.

5th.—From time to time each train is to be stopped and foreign cars (not equipped with either your brake or ours) are to be run into it, at irregular intervals, just as actual service requires constantly.

6th.—In the making up of trains, etc., crews are to be exchanged at random, so that the test may fully illustrate the convenience of operating each kind of brake in actual ordinary service.

7th.—Frequent short runs, stops and quick starts are to be made.

8th.—A series of yard tests are to be made, showing the action, convenience, etc., of the two brakes.

We mention a few necessary tests only, and you and we, as well as the test committee, are to add any number of others, it being distinctly understood that if you decline any test proposed by us, or we decline any proposed by you, it shall be condered an explicit and positive admission of inferiority.

This rule must in every case be strictly observed, namely: *Both brakes must be tested in precisely the same manner,* so that there may not only be absolute fairness, but no room for suspicion even of anything else.

You have been in the brake field a long time, have profited justly and largely from the patronage of railroads, and we are sure will welcome this plan for allowing your patrons and the American public to judge for themselves which brake should come into universal use.

Having proper confidence in the merits of your brake we know you will gladly and promptly accept our proposition herein made, as you must feel that the test will be complete.

The railroad public is a very fair-minded, capable body, and will most thoroughly appreciate and fully recognize the equity and fairness of our offer to you, and, in common with business-like peope everywhere, will naturally (and, we are sure you will admit, properly) consider it a virtual confession of inferiority and a public admission that the Westinghouse Brake is inferior to the Rote Brake and that it is unfitted for general freight service, should you decline or neglect to avail yourselves of the proposition we make you herein.

Permit us to add in closing that we wish to express to you our desire to have this communication received in the spirit in which it is sent, and to have it express to you our wish for a full, fair and searching test of the two articles in the relative merits of which the railroad interest is *primary* and that of the owners even secondary. Respectfully,

THE ROTE AUTOMATIC BRAKE COMPANY,

Per M. D. HARTER, President

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